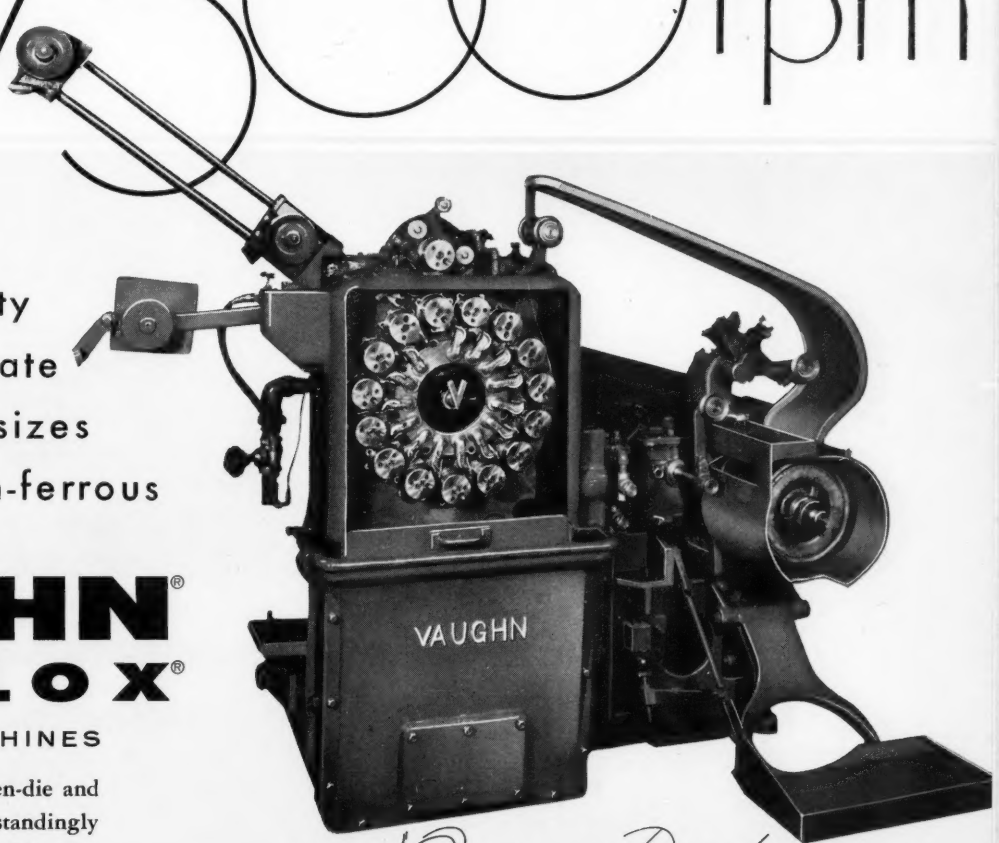
MAY 1956

WIRE AND WIRE PRODUCTS

SPEEDS UP TO 7500 fpm

Providing top productivity in the intermediate and fine wire sizes ferrous and non-ferrous



VAUGHN®
RINGBLOX®
CONTINUOUS MACHINES

Available in a range of thirteen-die and sixteen-die models, these outstandingly popular Vaughn continuous machines incorporate tandem design in a compact circular pattern—saving floor space and increasing production. Write for full details, outlining your capacity requirements.

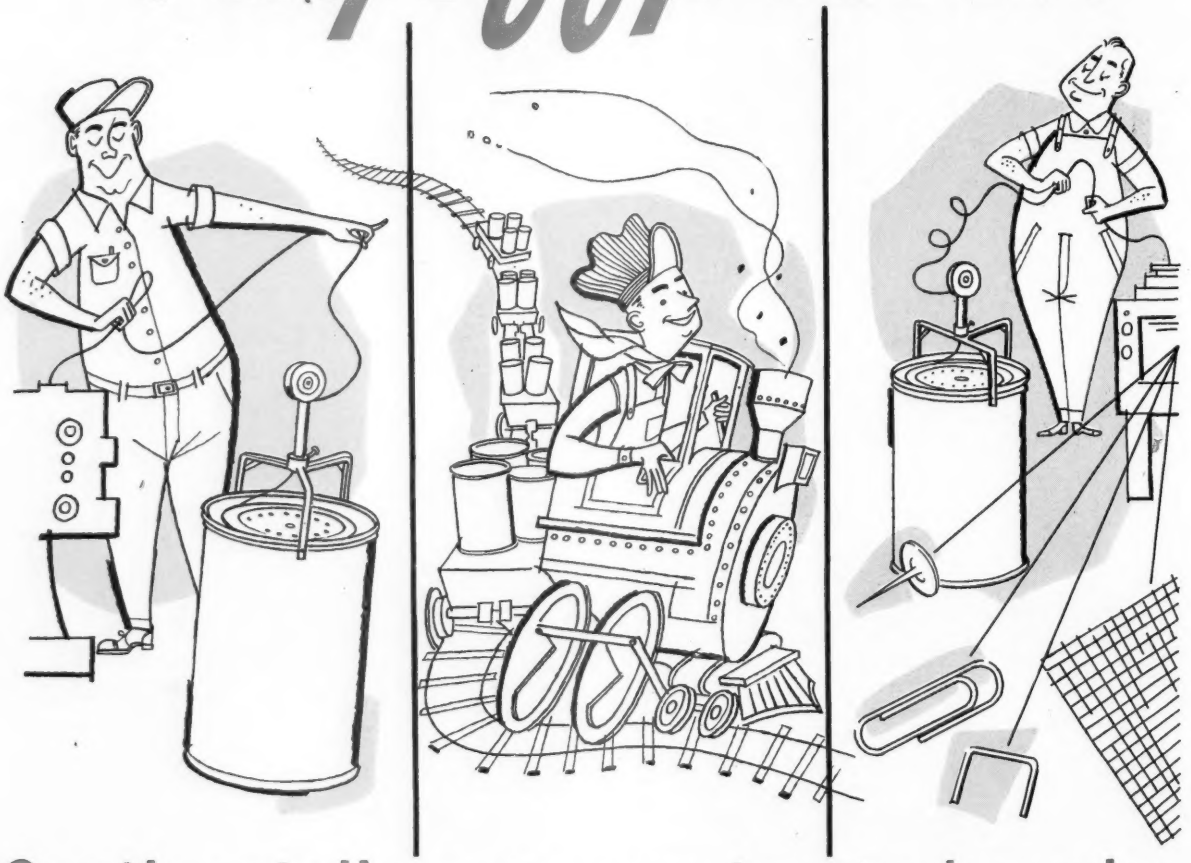
"Quick on the Draw!"

The VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

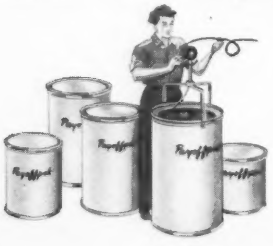
Payoffpak®...



Continental's new way to send a wire

By automatically packaging wire as it is drawn, Continental's Payoffpak has revolutionized the handling of wire! These fibre drums put an end to small manually handled coils that are costly to produce and costly to use. What's more, the wire is untouched by dirty or sweaty hands and remains protected in the sturdy drums until ready to use. Lightweight Payoffpaks can hold 600 lbs. of wire each; high stacking strength means you can save on storage space too.

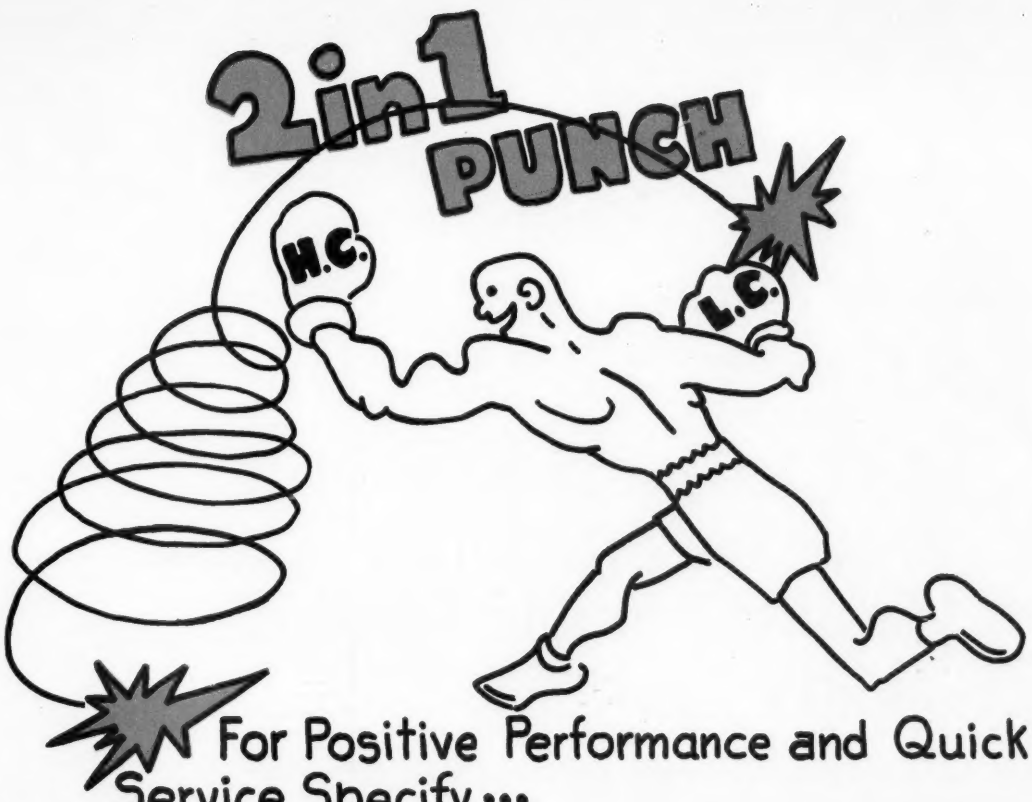
So check into Payoffpak—it will mean bigger profits for you. Call Continental soon for the interesting facts.



CONTINENTAL CAN COMPANY

FIBRE DRUM DIVISION • VAN WERT, OHIO

New York • Philadelphia • Pittsburgh • Tonawanda • Cleveland • Chicago
Atlanta • St. Louis • San Francisco • Los Angeles • Eau Claire • Boston



For Positive Performance and Quick Service Specify ...

"America's Finest Wire Drawing Lubricants"

HAVE YOU INVESTIGATED

Standard 55?

More Rope Wire Is Drawn Thru Standard No. 55 Than All The Rest of the Wire Drawing Lubricants Combined.

Standard No. 55 Has Numerous Other Splendid Applications—May We Show You Why?

Standard Industrial has pioneered in most of the outstanding contributions to better wire drawing through better lubricants. Consult Standard Industrial for the solution of your difficult problems.

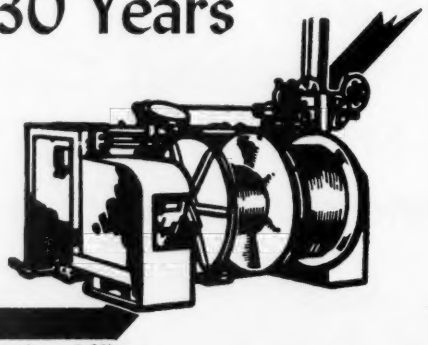
Standard Industrial COMPOUNDS CO., INC.
FRANKFORT, ILLINOIS
(A suburban Chicago area city)
TELEPHONES: 2131 — 2141 — 2151

To Modernize Your Plant, Increase Efficiency And Assure Durable Dependability Look To.....

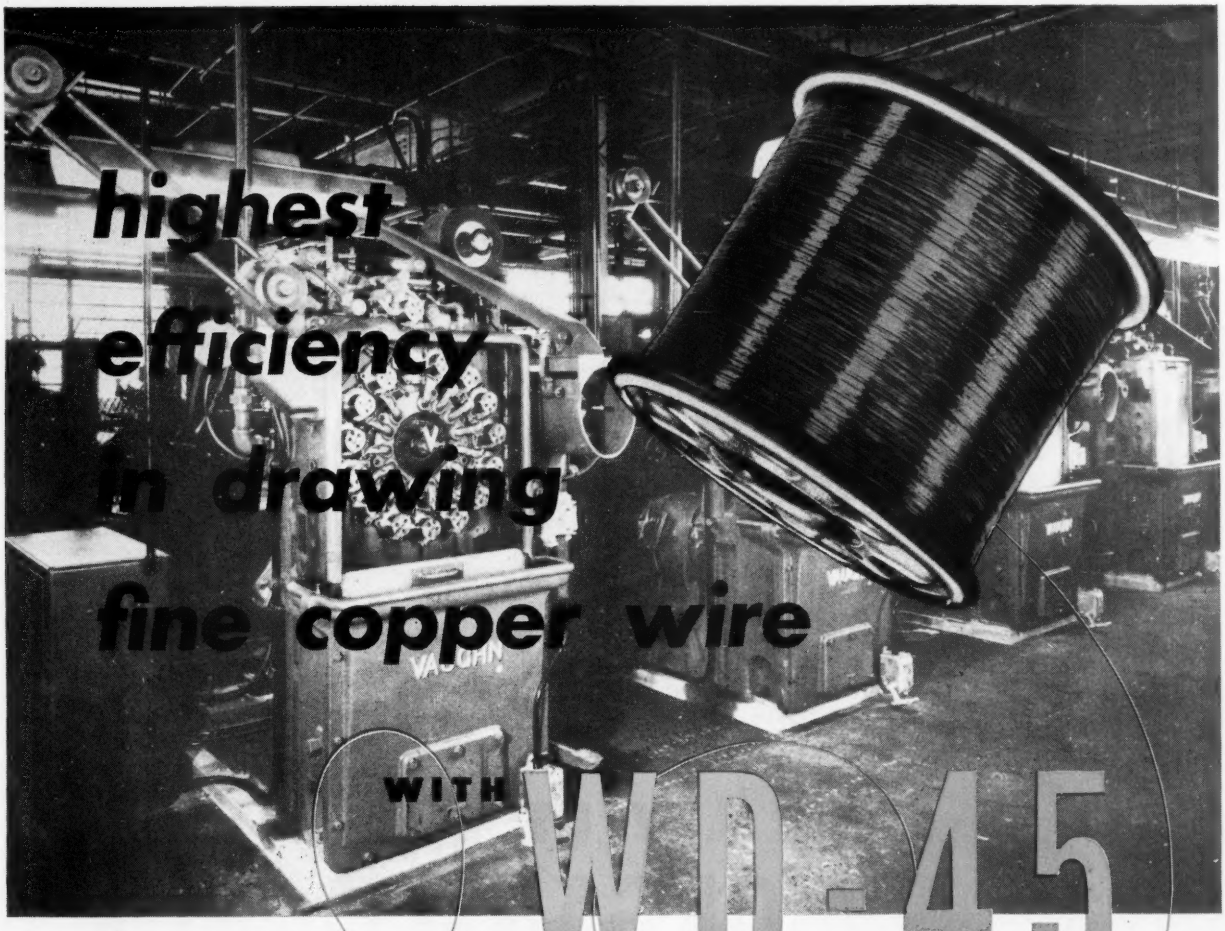
ENTWISTLE MANUFACTURING CORPORATION

FORMERLY **JAMES L. ENTWISTLE CO.**

Leading Designer And Builders Of Wire Machinery For Over 30 Years



Plant and Executive Offices
1475 ELMWOOD AVE., CRANSTON (PROV. 7), RHODE ISLAND



....THE ECONOMICAL ANSWER TO TROUBLE-FREE COPPER WIRE DRAWING OPERATIONS, RESULTING IN:

Increased machine proficiency at high speeds • Cleaner machines • Higher copper soap tolerance • Controlled soap to fat ratio • Cleaner wire for better enamelling • Economical to use – Low concentration • Hard and soft water flexibility.

We will be in attendance at the REGIONAL MEETING in KANSAS CITY and will be glad to discuss any of your wire drawing problems.

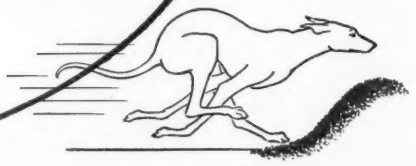
APEX ALKALI PRODUCTS COMPANY

Lubricants & Cleaning Compounds for Wire and All Wire Products

Main and Rector Streets • Philadelphia 27, Pa. • IV 3-3939

DRAW IT FAST

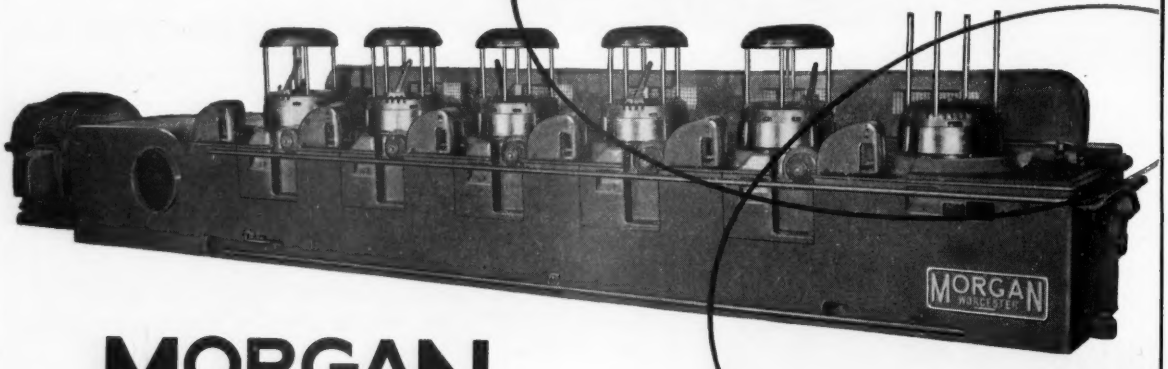
No-slip storage principle and air-cooling permit speedy drawing.



DRAW IT COLD

Exclusive air-cooling method removes heat from wire—insures meeting exacting specifications.

DRAW IT ON MORGAN-CONNOR WIRE DRAWING MACHINES



MORGAN WORCESTER

Write for details to:

WM-92

Morgan Construction Company WORCESTER, MASS.

ROLLING MILLS • MORGOIL BEARINGS • REGENERATIVE FURNACE CONTROL • EJECTORS • GAS PRODUCERS

WIRE AND WIRE PRODUCTS*

Reg. U. S. Pat. Off.

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 31 May, 1956 No. 5

Designated as Official Publication By The Wire Association

Contents

Editor's Desk 535

Drawn Shaped Hollow Mandrels
by Robert W. Campbell 537

Progress Through Research
by Bruce W. Gonser 539

Spiral Multicolored PVC Jumper and Switchboard Wire
by Gerard de Senarclens 541

Regarding Chains
by Dr. Ing. Hubert 547

The Wire Association Mid-West Regional Meeting 548

The Predetermination of Tensile Strengths in Steel Wire Manufacture
by C. Coates 549

Protection Problems on Telephone Distribution Systems
by J. W. Phelps 555

2000 Mile Telephone Cable to Span Atlantic
by Edwin K. Langille 560

The Wire Association West Coast Regional Meeting .... 559 and 562

Government Wire Production Information 563

Outstanding Personalities of the Wire Industry 571

A Review of Recent Wire Patents 581

Steel Statistics 583

Copper Statistics 584

Aluminum Statistics 598

Index to Advertisers 603

Where-To-Buy 604-608

WIRE and WIRE PRODUCTS is indexed regularly by Engineering Index, Inc., New York, N. Y.

RICHARD E. BROWN, President and Publisher

R. S. Spengel, Secy.-Treas. & Gen'l. Manager
J. Edward Donnellan, Vice-President

Edmund D. Sickels, Editor

— ASSOCIATE EDITORS —
Lancaster, Allwine & Rommel, Consultants on Patent Information

Publication Office: Jersey City, N. J.
Executive Office: 453 Main St., Stamford, Conn.
*Reg. U. S. Pat. Off.

WIRE & WIRE PRODUCTS, Vol. 31, No. 5, May, 1956. Publication Office at One Sherman Avenue, Jersey City, N. J. Executive Office 453 Main Street, Stamford, Conn. Published monthly by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Sec'y and Treas. Subscription Price: U. S. $8.00; Canada, $8.00 per year; Domestic 75 cents per copy; Foreign 90 cents per copy, except October Convention Issue and January Proceedings Issue, $1.25 per copy; Foreign $10.50 per year. Entered as second class matter at the Post Office, Jersey City, N. J. under the act of March 3, 1879.

Copyright, 1956 Quinn-Brown Publishing Corp.

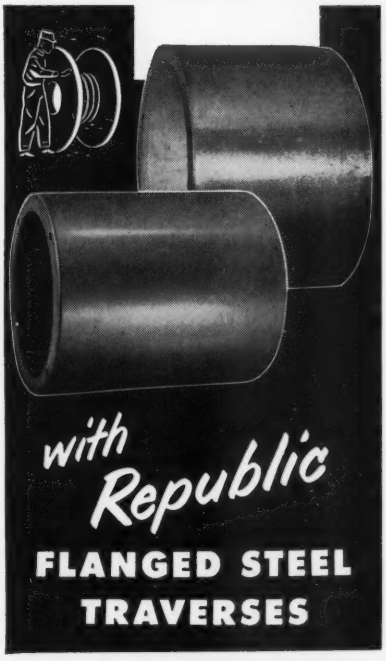
Scott Printing Company, Jersey City 7, New Jersey

REPUBLIC STEEL CORPORATION
Pressed Steel Division
6102 Truscon Avenue, Cleveland 27, Ohio

☐ Please send more information on Republic Flanged Steel Traverses.

Name_____ Title_____
Company_____
Address_____
City_____ Zone____ State_____
C-1412

SIMPLE
4 STEP
ASSEMBLY
For Wire and Cable Reels



with Republic
FLANGED STEEL
TRAVERSES

It's as easy as this:

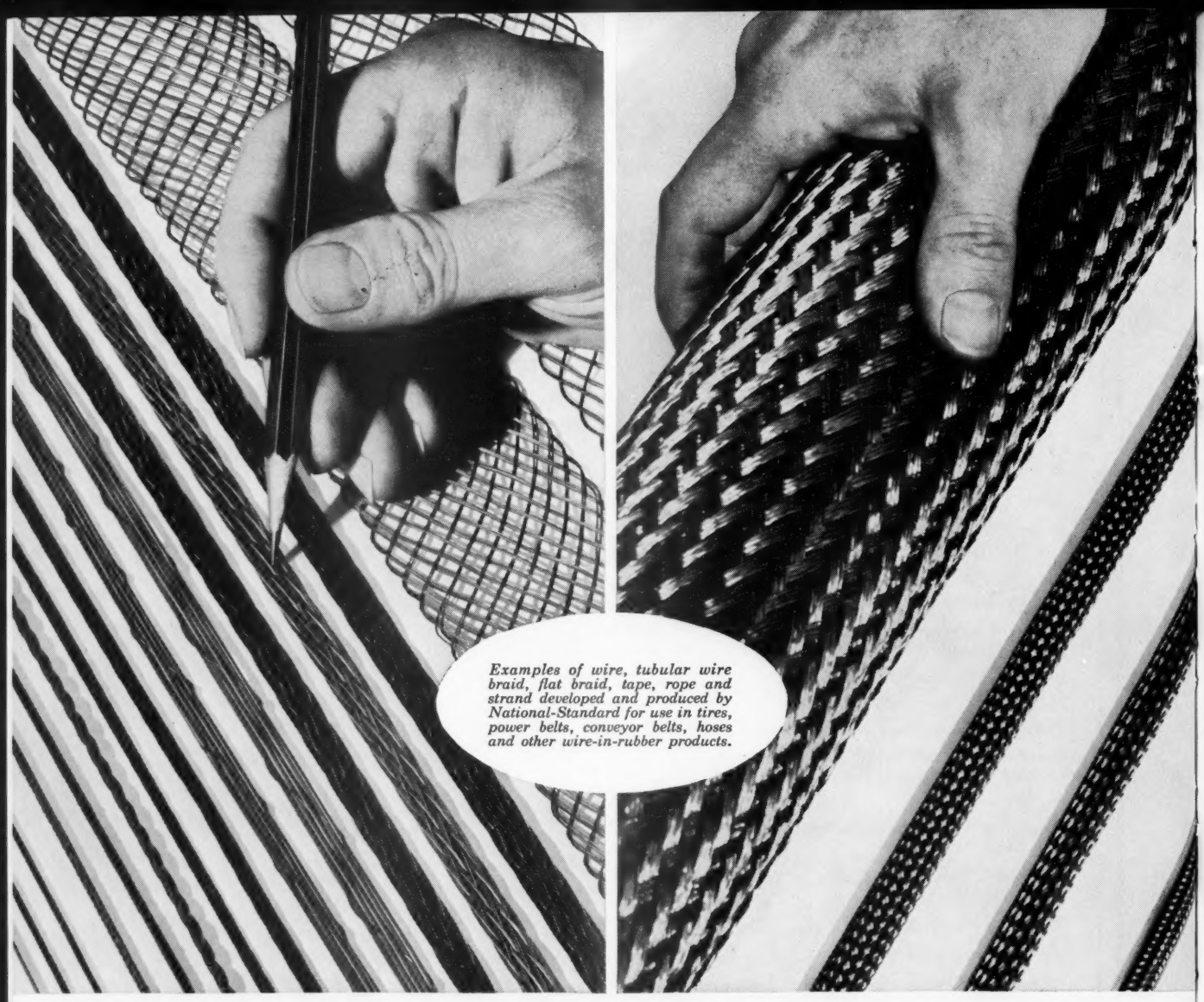
1. Insert bolts through wooden head
2. Lay wooden head flat on floor
3. Place traverse in position
4. Fasten second wooden head in place

• No special tools—no experience necessary. Your reels will last for years—and save money.

Made in sizes up to 56-inch diameter and 48-inch traverse—in plain, painted or hot dip galvanized finish—as light as 18-gage steel. Width of flange and number of bolt and drain holes furnished to your specifications. Available for prompt delivery. Write for prices.

* * *

Manufactured under license arrangement with Western Electric Co., Inc.



Examples of wire, tubular wire braid, flat braid, tape, rope and strand developed and produced by National-Standard for use in tires, power belts, conveyor belts, hoses and other wire-in-rubber products.

How product "X" might be improved

● Whatever you make, from cheese slicers to electronic brains, chances are wire of some kind in some form enters into your product make-up. Maybe it isn't special wire. Maybe it should be! In either case it is in this area that National-Standard service might help you produce a better product at lower cost.

For example, National-Standard has long devoted large scale research and engineering to improving the teamwork of wire and rubber—extensive work on wire fabrication, material, finish, corrosion, strength, elongation, adhesion and other factors that affect the behavior and cost of wire-in-rubber products.

You can draw on the fruits of all this and similar work performed for many other industries on the most effective use of wire.

So if you even suspect that a different or specially developed type of wire might improve your product or speed production, don't hesitate. Consult with National-Standard. We make a point of such service . . . want to be of help . . . and are geared to do it well, without obligation. Check with us now . , . or any time!

NATIONAL-STANDARD COMPANY • NILES, MICHIGAN
Tire Wire, Stainless, Fabricated Braids and Tape

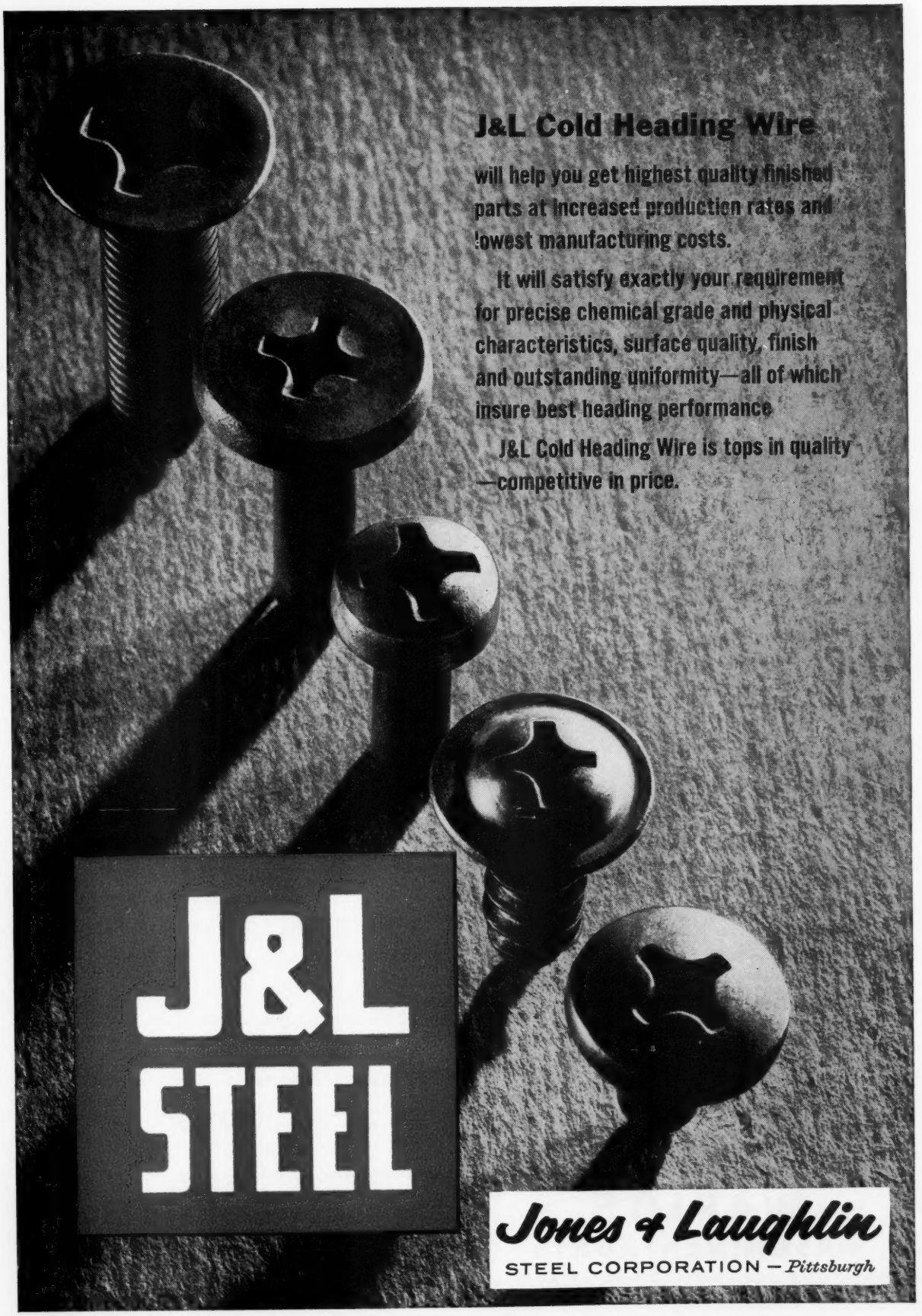
ATHENIA STEEL DIVISION • CLIFTON, N. J.
Flat, High Carbon, Cold Rolled Spring Steel

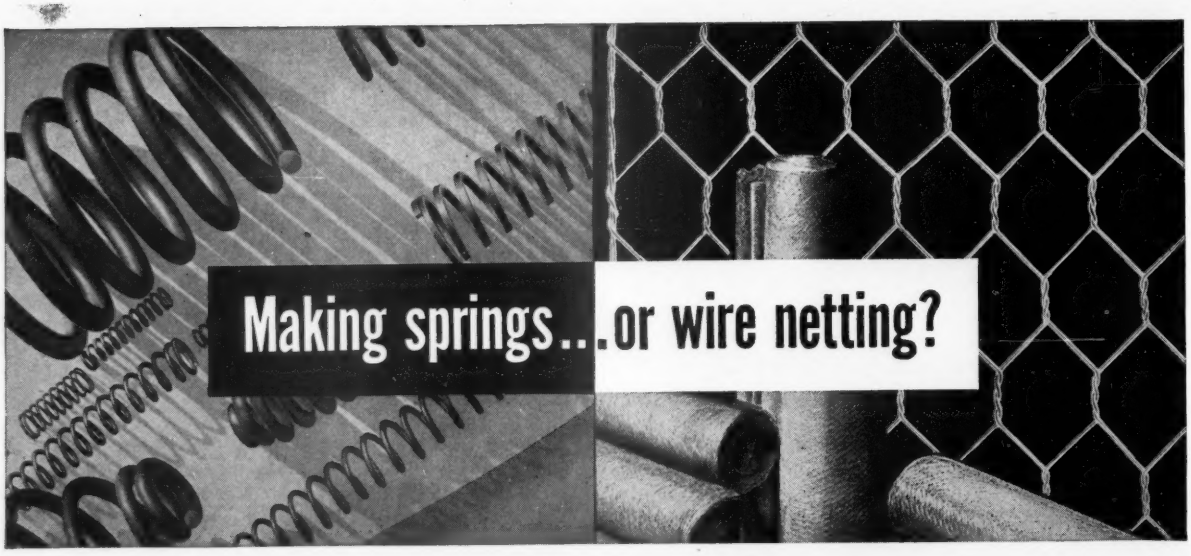
REYNOLDS WIRE DIVISION • DIXON, ILLINOIS
Industrial Wire Cloth

NS
NATIONAL-STANDARD
Company
NILES, MICHIGAN

WAGNER LITHO MACHINERY • JERSEY CITY, N. J.
Special Machinery for Metal Decorating

WORCESTER WIRE WORKS DIVISION • WORCESTER, MASS.
Round and Shaped Steel Wire, Small Sizes

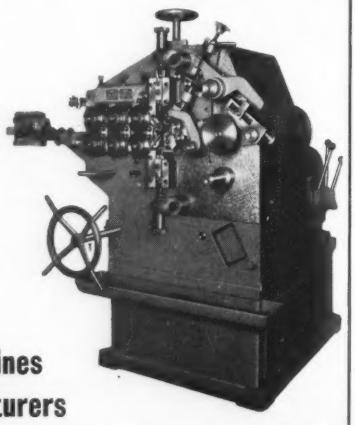

J&L Cold Heading Wire
will help you get highest quality finished parts at increased production rates and lowest manufacturing costs.
It will satisfy exactly your requirement for precise chemical grade and physical characteristics, surface quality, finish and outstanding uniformity—all of which insure best heading performance
J&L Cold Heading Wire is tops in quality —competitive in price.
J&L STEEL
Jones & Laughlin
STEEL CORPORATION — Pittsburgh



Use the 60 years' experience built into WAFIOS automatic machines

You can produce right and left-hand springs in cylindrical, single and double-cone shapes, both open and close-wound with WAFIOS UNIVERSAL AUTOMATIC SPRING COILING MACHINES. Specially shaped springs, springs with closed ends and torsion springs with shanks can also be manufactured on these machines.

They're compact, accurate, simple and economical machines to operate and easily adjusted; have 2-3 wire feed speeds; 18 to 30 steps for wire length adjustment. Automatic stopping of feed rollers during cutting off. Coiling dies, pitch tool and cutter mandrel can be adjusted during operation.



Type UFM50R handles wire sizes from #19 to #6 AS&WG—produces springs up to 3" outside diameter at rates of about 48, 68 and 88 per minute. Other UFM types for wire sizes from #40 AS&WG to ⅝".

Other Wafios Machines for spring manufacturers

Spring end grinders; simple spring coilers; machines for special tension springs; winders for cylindrical tension and compression springs, bowdencoils, spirals for electrical appliances, baby carriage springs, spirals for spring roller bearings, special section spirals, springs for clothes pegs; looping machines; lock washer machines; torsion spring winders.

Write for Catalog No. 201

WAFIOS
MASCHINENFABRIK
Wagner, Ficker & Schmid • Reutlingen 3, Wuerttemberg, Germany

All types of square mesh netting with both edges knuckled or with ends spiral twisted are made on this WAFIOS AUTOMATIC DOUBLE SPIRAL CHAIN LINK FENCING MACHINE. Width of mesh from ⅜" to 2". For wire sizes from 16½ to 9½ AS&WG.

Other sizes and types for automatic and semi-automatic manufacture of chain link fencing in a wide range of mesh widths and wire sizes.

WAFIOS MACHINES for Wire Netting and Wire Mesh Fabrics . . .

Complete equipment for the manufacture of hexagonal, straight line and triangular mesh wire netting.

Automatic machinery for the manufacture of barbed wire and staples.

Round mesh weaving machines for the manufacture of 1-, 2- and 3-ply round mesh weaving for mattresses and other applications. Manual, semi-automatic and automatic types. Also used for crossed and interwoven mesh for many other applications.

Wire crimping machines in manual and automatic types. **Assembling looms** for the manufacture of crimped mesh from crimped wire.

Write for Catalog No. S-100

Sole distributor for U.S.A.:

KURT ORBAN COMPANY, INC.
34 Exchange Place, Jersey City, N. J.

Sole agents for Australia and New Zealand:
Bliss & Reels Co. Pty. Ltd., 64-66 Little Bourke St., Melbourne C. 1, Australia

Designing a new wire product?

Call American Steel & Wire!

Steel wire comes in so many different grades, shapes and finishes that it isn't easy to keep them all at your fingertips.

For this reason, we suggest that you give your American Steel & Wire representative a chance to help with new designs while they are still on the drawing board. He may be able to suggest 1) a more economical wire, 2) a wire that will fabricate more easily or 3) a slight design change that will simplify production or lower the cost of the raw material.

At AS&W, we *use* a lot of wire in our own plants; and have learned many little tricks that are yours for the asking. Just call your American Steel & Wire representative.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS AMERICAN MANUFACTURERS WIRE

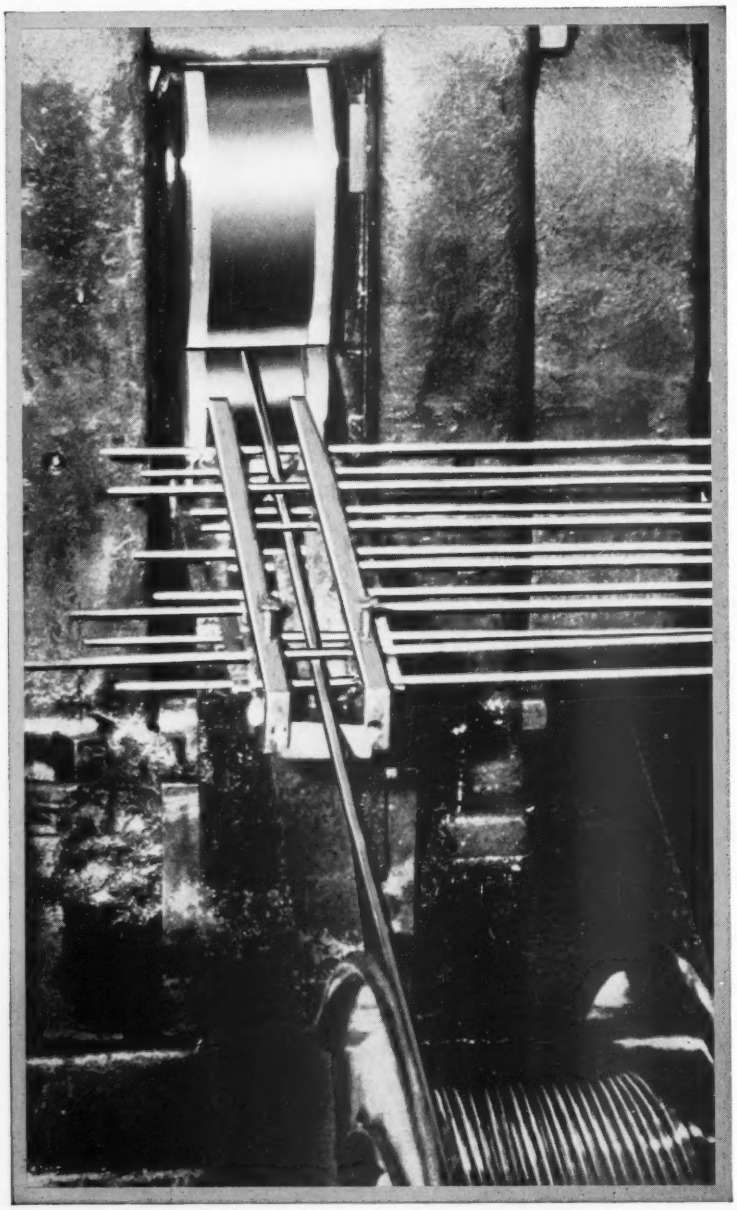
USS TRADE MARK

AMERFINE—*high quality fine wire.*
AMERSPRING—*music steel spring wire.*
AMERTEMP—*heavy-duty oil-tempered wire.*
AMERLOY—*alloy heading wire.*
AMERHEAD—*uniform heading wire.*
AMERSTITCH—*extra-tough metal stitching wire.*

UNITED STATES STEEL

Carbide rolls outlast steel 25 to 1, and...

Produce flat wire with greater salability– and realize substantial manpower savings



Precision textile loom reed, produced at the Knowles Loom Reed Works, Inc., with Carboloy® cemented carbide rolls, has been noticeably free from the imperfections caused by steel rolls. Steel rolls mushed as they wore, crowning the wire and causing numerous rejections. The uniform tolerance of carbide rolls eliminated this. Further – the lasting high-luster finish of carbide rolls was imparted to the reeds. Such reeds were and are far more marketable than those produced with steel rolls.

This greater marketability assured greater profits – for the use of cemented carbide rolls also resulted in noticeable manpower savings. Steel rolls expanded and contracted under the heat of the run, requiring a man on every machine to inspect reed tolerances. Because carbides are not affected by heat, *one* man can now handle several machines.

All machine downtime due to roll changes as well as roll refinishing, has been eliminated. In fact, after 10 million revolutions – more than a year of continuous running on the same spot – the Carboloy cemented carbide rolls show no signs of wear.

This Knowles case history of improved product quality, reduced manpower and maintenance costs, and longer roll life is typical of the benefits Carboloy cemented carbides are bringing to the wire industry.

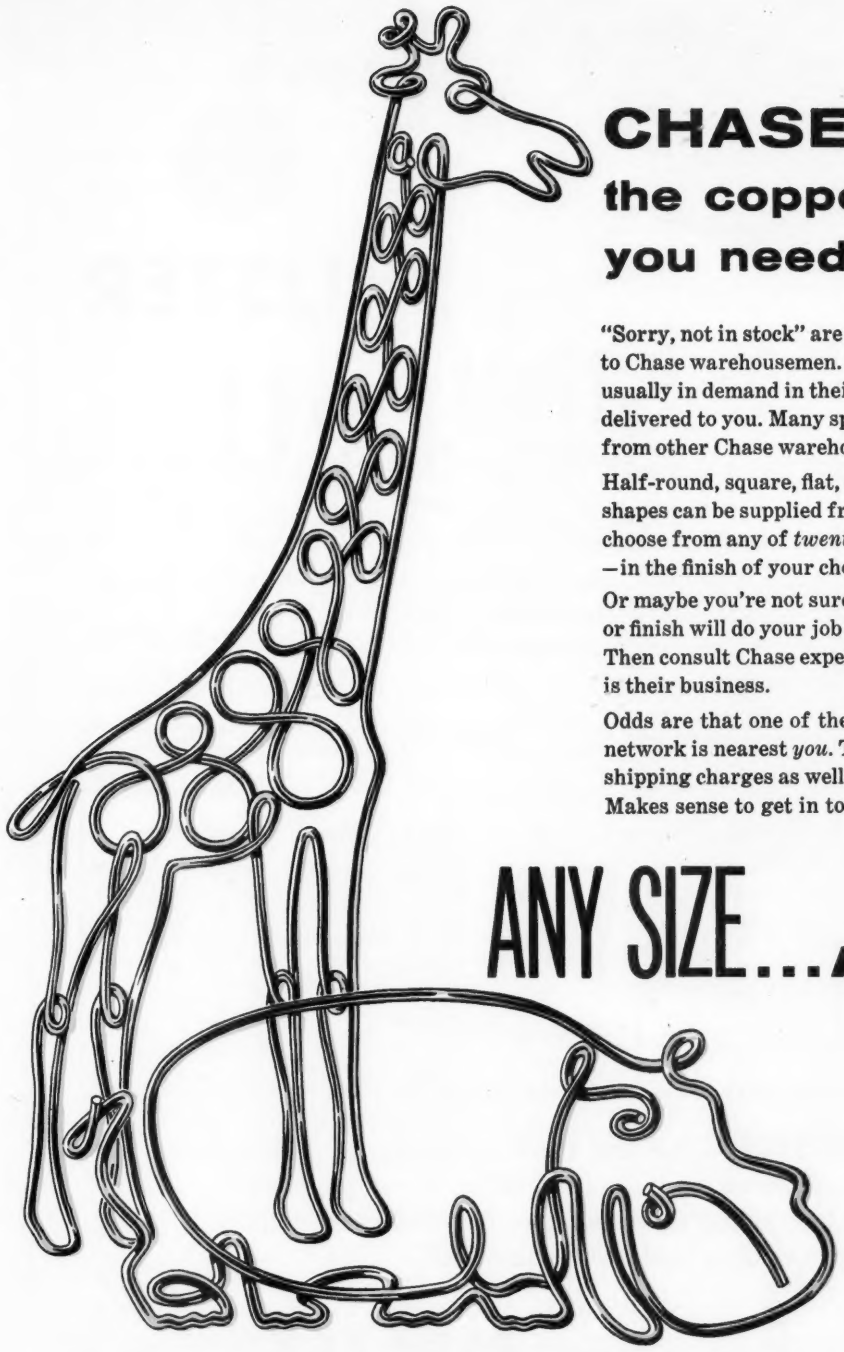
Whether your business is flattening, drawing, extruding, or heading, there's a Carboloy product to fit your needs. For more information, or in-plant assistance from a Carboloy Wire Die Engineer, write today.

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

11171 E. 8 Mile Blvd., Detroit 32, Michigan



CHASE® can supply the copper alloy wire you need

"Sorry, not in stock" are almost unheard of words to Chase warehousemen. They have stocks of the alloys usually in demand in their area—ready to be quickly delivered to you. Many specials can be obtained for you from other Chase warehouses.

Half-round, square, flat, oval, as well as irregular shapes can be supplied from the Chase mills. You can choose from any of *twenty-three* different copper alloys —in the finish of your choice.

Or maybe you're not sure *which* shape or alloy or temper or finish will do your job best and at lowest cost. Then consult Chase experts. Helping you solve problems is their business.

Odds are that one of the warehouses in the huge Chase network is nearest *you*. That means savings on shipping charges as well as faster delivery. Makes sense to get in touch with Chase today!

ANY SIZE...ANY SHAPE

- ROUND
- HALF-ROUND
- SQUARE
- FLAT
- OVAL

AND OTHERS

Chase®

BRASS & COPPER CO.

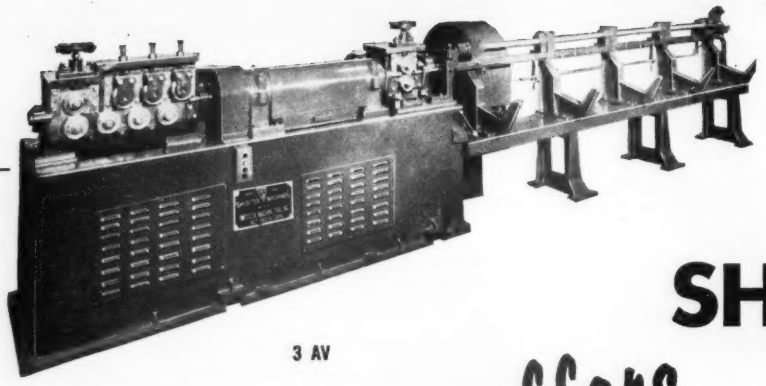
WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

CALL CHASE FOR STAINLESS STEEL TOO!

NEW! Chase's informative wire and rod movie: "IN THE CHIPS." Arrange for a free loan of this film by contacting the Chase warehouse or sales office near you. Write on your company letterhead, today!

The Nation's Headquarters for Brass & Copper (†sales office only)

Atlanta	Chicago	Denver	Indianapolis	Minneapolis	Philadelphia
Baltimore	Cincinnati	Detroit	Kansas City, Mo.	Newark	Pittsburgh
Boston	Cleveland	Grand Rapids†	Los Angeles	New Orleans	Providence
Charlotte†	Dallas	Houston	Milwaukee	New York	Rochester†
	St. Louis	San Francisco	Seattle	Waterbury	



3 AV

90th year

SHUSTER offers most!!

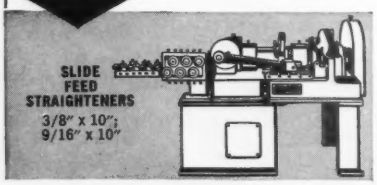
In Wire Straightening and Cutting, SHUSTER variable speed machines consistently provide the newest tested principles of operation – SHUSTER'S 90 years' know-how will cut your wire straightening and cutting costs every day!

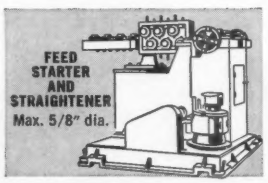
	SHUSTER	Manufacturer B	Manufacturer C	Manufacturer D
Infinite variable speed of all feed and cutoff ranges	YES	NO	NO	NO
Electrically controlled Target and Clutch	YES	Some Models	NO	NO
Power Consumption	LOW	HIGH	MEDIUM	HIGH
Complete On-The-Job Engineering service	YES	NO	NO	NO
Flat and Shape Stock Machines available	YES	YES	NO	NO

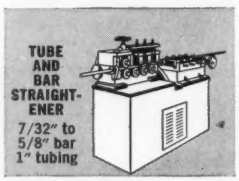
SHUSTER – the *first* name (since 1866) in Wire Straightening and Cutting, offers *more* production features, at less investment and operating cost, than have ever been available in the field!

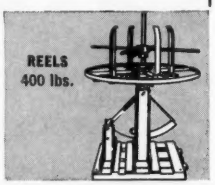
METTLER
MACHINE TOOL, INC.
155 West Adeline Street, New Haven, Conn.

This too is SHUSTER.





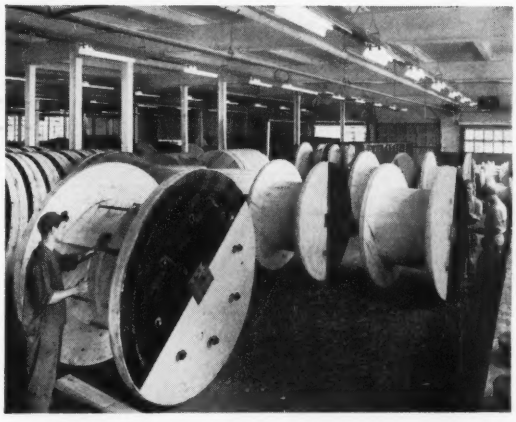




ever STOP and think....

of what it costs $ annually to ship your Electrical Wire and Cable the old fashioned way?

NOW is the time to check and compare with the savings that can be realized by the use of NON-RETURNABLE wood shipping reels.



Look at these advantages:

- *Reduced Reel Investment*
- *Less Storage Space*
- *Lower Freight Costs*
- *No Repair Costs*
- *No Return Freight Costs*
- *No Bookkeeping*
- *No Cash Deposits Req'd.*
- *No More Headaches ! !*

MANY of your current problems can either be greatly reduced or completely eliminated through the use and advantages of NON-RETURNABLES.

NON-RETURNABLE REELS ALLOW DEFINITE PACKAGING COSTS.

HIGH SPEED

SHIPPING SERVICE in our... OWN TRUCKS

within a radius of 200 miles from the plant. Fast freight will bring you Bridge reels in 5 days or less east of the Mississippi.

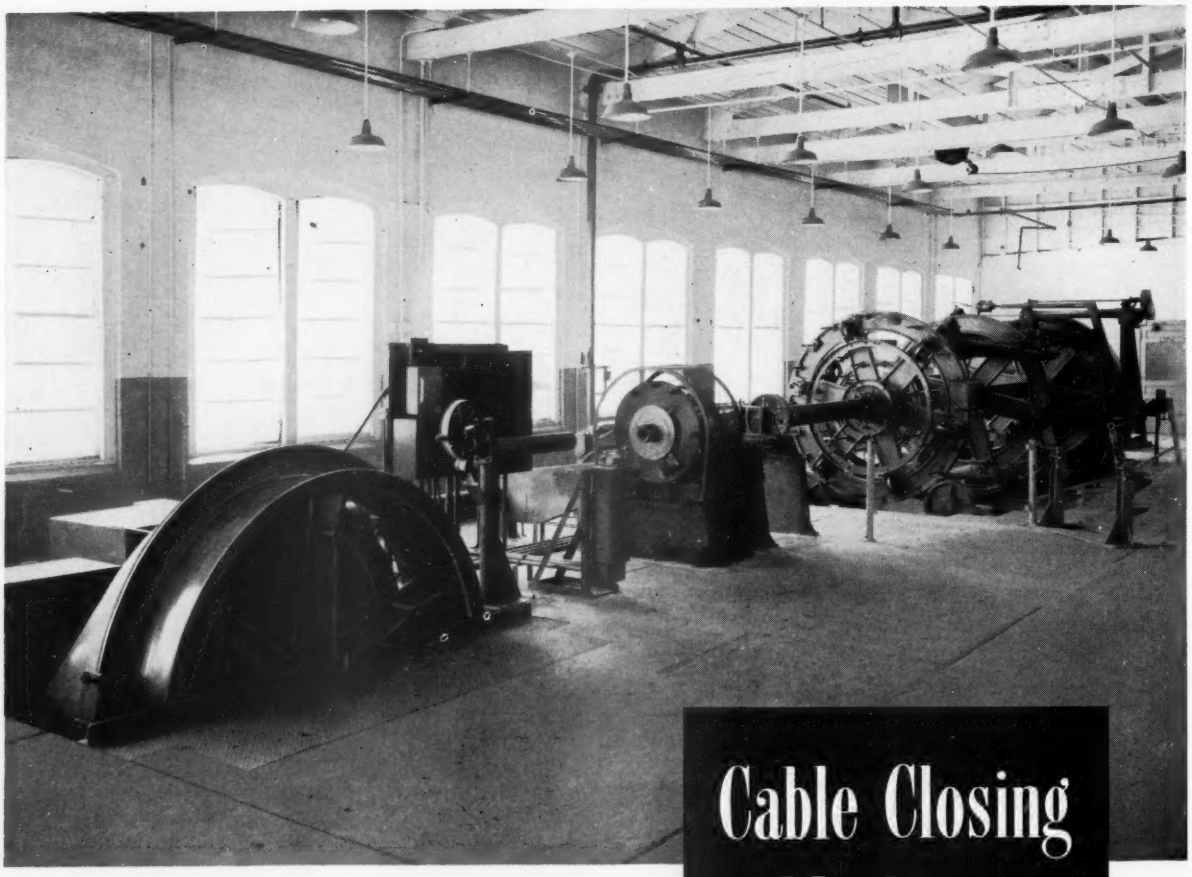
BRIDGE
MANUFACTURING COMPANY
HAZARDVILLE, CONNECTICUT

Telephone . . .
Thompsonville, Connecticut
RIverview 9-8308

"REEL GOOD . . .

Let us quote on your reel needs. Send your specifications. Better yet, visit our plant and see how and why our reels are made so well at so low a cost.

WOOD REELS"



Machine illustrated is 7-strand Closer for 60" x 48" reel.

Cable Closing Machines

Nebuttco Cable Closers for 3, 4, 6, 7, and 8 strands are widely used by leading producers of quality cables. Provision is made for applying jute fillers; eccentric or concentric tape heads can be supplied. Air brakes operating on flyer rim and main drive shaft insure stopping with the least strain on drive gears. Reels of 36", 42", 48", and 60" diameter can be accommodated. Capstans can be provided up to 96" diameter in either single or double drum types. Write for further information and details.

NEW ENGLAND BUTT CO.

DIVISION WANSKUCK COMPANY

304 Pearl Street · Providence 7, R. I.

In England — James Day (Machinery) Ltd., 28 Maddox Street, London, W-1.

NEBUTTCO

Braiders — Bunchers
Cablers — Stranders
Take-Ups — Taping Machines

New Life

for old wire furnaces

Many wire producers have already taken advantage of the Lee Wilson offer to convert older annealing furnaces into high convection units.

These producers have found this conversion to be extremely profitable. By rebuilding outmoded furnaces, adding high input "O" Tubes and high velocity circulation systems, the increase in the average annealing production is at least 40 percent, with no increase in floor space requirements.

Why not get all the facts on this modernization plan? Contact the Lee Wilson sales engineer in your area or write direct.

Lee Wilson

ENGINEERING COMPANY, Inc.

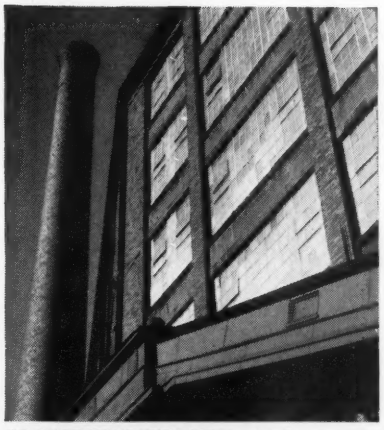
20005 WEST LAKE ROAD • CLEVELAND 16, OHIO

BRUSH OFF. Power brushes for polishing, deburring and rough metal finishing use CF&I-Wickwire Brush Wire.

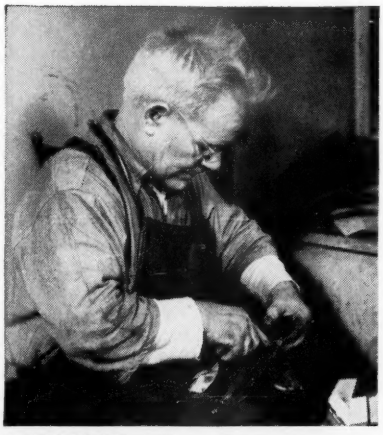
HIGH FASHION FASTENERS. This eye-catching gown has hook and eye fasteners made of CF&I-Wickwire® Hook and Eye Wire for secure, inconspicuous closures.

F O R T H O U S A N D S O F U S E S

from dressing up a beautiful lady... to dressing down a metal casting... nothing has so many uses as wire!



NO SHATTERED WINDOWS in this factory. The hex mesh netting for plate glass reinforcement is made of annealed CF&I-Wickwire Glass Netting Wire.



SOLE SUPPORT. Millions of nails—from shoemaker's tacks to heavy spikes—are used annually by scores of industries. Nails are made from CF&I-Wickwire Industrial Quality Basic Wire.

PIN-UP has been a snap for mothers ever since the invention of the safety pin. Today, millions of these indispensable fasteners are made from CF&I-Wickwire Safety Pin Wire.

FOR DRIVING SAFETY. This windshield wiper is operated by dependable, high tensile strength CF&I-Wickwire Cord Wire.

Everybody knows that steel is indispensable to today's manufacturer, today's living . . . yet few people realize that wire is the most widely applicable, the most versatile form in which steel is used. Here's the reason — wire lends itself to thousands of extremely diversified applications. Strength? Wire has it. Ductility? Wire is the first thing you think of. Good looks? Wire can be plated and finished in many attractive ways. On every score, nothing offers so many useful and variable properties as wire.

Whatever you make, process, or assemble, you'll find that CF&I-Wickwire Wire fits into the picture to perfection. We have the experience and the facilities to provide exactly the wires you need from plants conveniently located from coast to coast. Write our nearest sales office for complete details.

3148

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver
El Paso • Ft. Worth • Houston • Lincoln (Neb.) • Oklahoma City • Phoenix • Pueblo • Salt Lake City • Wichita
PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

CF&I

HIGH QUALITY

fiber glass yarns for wire and cable insulation

Pittsburgh Fiber Glass yarns are made of exceptionally uniform continuous filaments, twisted and plied for any desired buildup. They are packaged for use with all standard types of serving and braiding machinery.

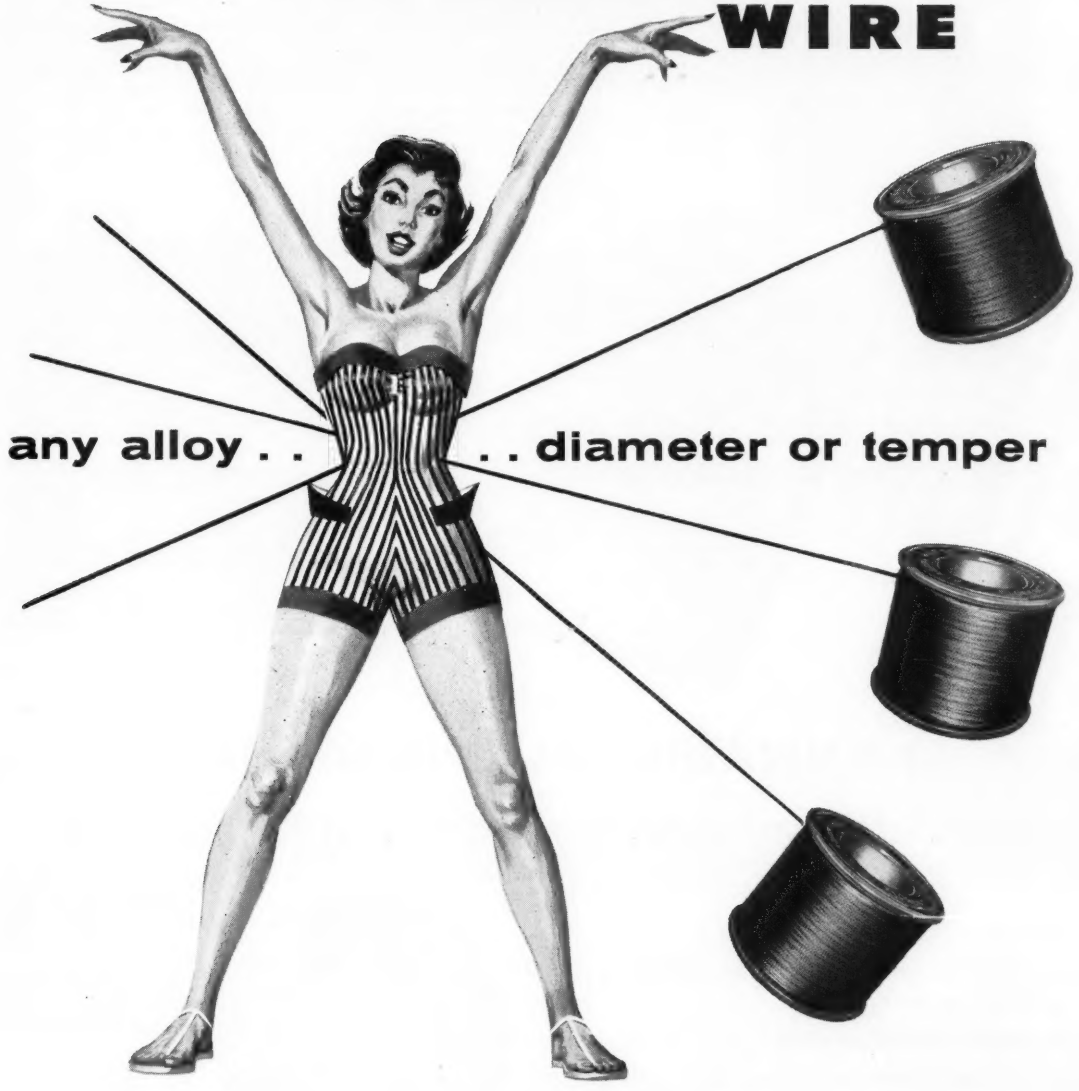
Pittsburgh yarns have proved their high quality with numerous manufacturers. If you have not yet put them to your tests, you are invited to make arrangements through our executive or district sales offices. Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pennsylvania.

FIBER GLASS

PAINTS · GLASS · CHEMICALS · BRUSHES · PLASTICS

PITTSBURGH PLATE GLASS COMPANY

ALABAMA WIRE



Alawire—aluminum wire drawn to your specifications—from .375″ to .187″ to .064″ to .010″ or **any** diameter in between. Alawire, available to you in any alloy and finished in any temper, is shipped on fifteen pound spools (as shown) or two hundred pound drums as desired.

For further information or quotation, please write, wire or phone—

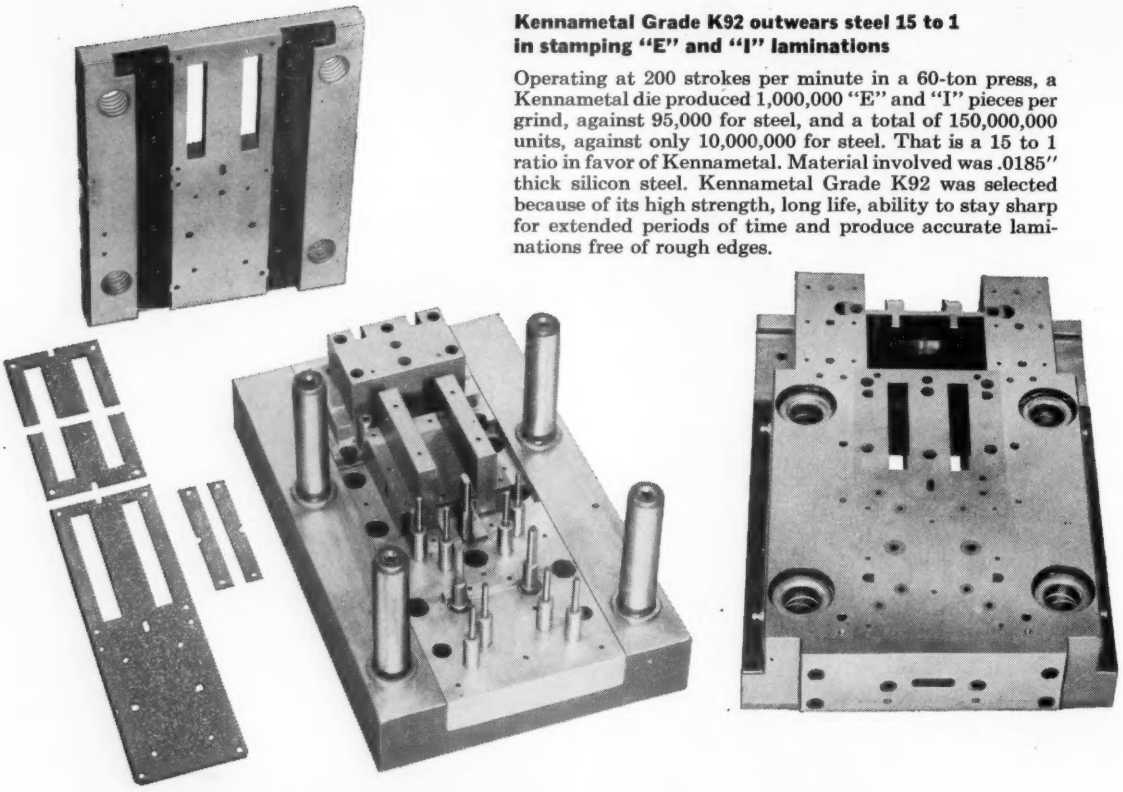
ALABAMA WIRE CO., INC.

TERRACE STREET • P.O. BOX 562WW • FLORENCE, ALABAMA

Phone 3178

ALCOA ALUMINUM

MANUFACTURERS OF METAL-MESH INSECT SCREENING



Kennametal Grade K92 outwears steel 15 to 1 in stamping "E" and "I" laminations

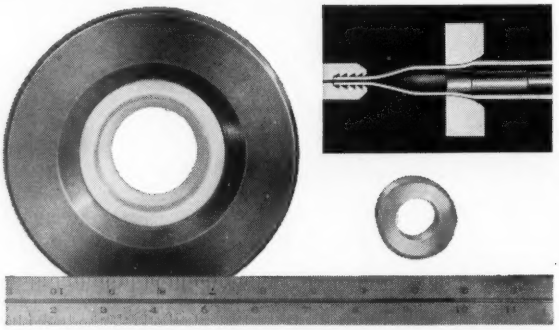
Operating at 200 strokes per minute in a 60-ton press, a Kennametal die produced 1,000,000 "E" and "I" pieces per grind, against 95,000 for steel, and a total of 150,000,000 units, against only 10,000,000 for steel. That is a 15 to 1 ratio in favor of Kennametal. Material involved was .0185" thick silicon steel. Kennametal Grade K92 was selected because of its high strength, long life, ability to stay sharp for extended periods of time and produce accurate laminations free of rough edges.

KENNAMETAL* Die Grades provide outstanding die performance

- **sustain high production rates**
- **maintain accuracy over extremely long production runs**
- **decrease operating costs**

Kennametal Die Grades have many distinctive qualities: high hardness, unusual transverse rupture and crushing strength, high modulus of elasticity, great resistance to abrasion, ability to take a high polish and a "slippery" quality to resist galling. Varied combinations of these properties are found in the nine Kennametal Die Grades in the "80" and "90" Series. There's a "right" grade to stand up at high production rates, over long runs, and produce parts of consistent accuracy and finish on any application . . . blanking, stamping, compacting, cold heading, swaging, forming, drawing, and so on. Our die engineers will gladly work with you on your die problems, and recommend the right grade for each job. Call your nearest Kennametal office or write KENNAMETAL INC., Latrobe, Pennsylvania.

*Registered Trademark



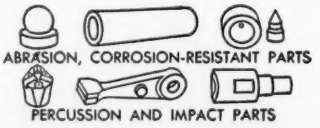
Tube drawing increased from 500 feet to over 75 miles; Nib cost cut from 40¢ to 1¢ per 100 feet of tubing

Against average life of only 500 feet of tubing for chrome coated steel mandrel, a mandrel nib of Kennametal Grade K84 showed only .003" wear after 75 miles of tubing. In addition to reducing nib costs from 40¢ to 1¢ per 100 feet of tubing, great savings were realized on reduced scrap and lower machine downtime for mandrel changing. Kennametal Grade K84 was used for cold drawing 1½" diameter, .083" wall seamless steel tubing to 1 5/16" diameter.

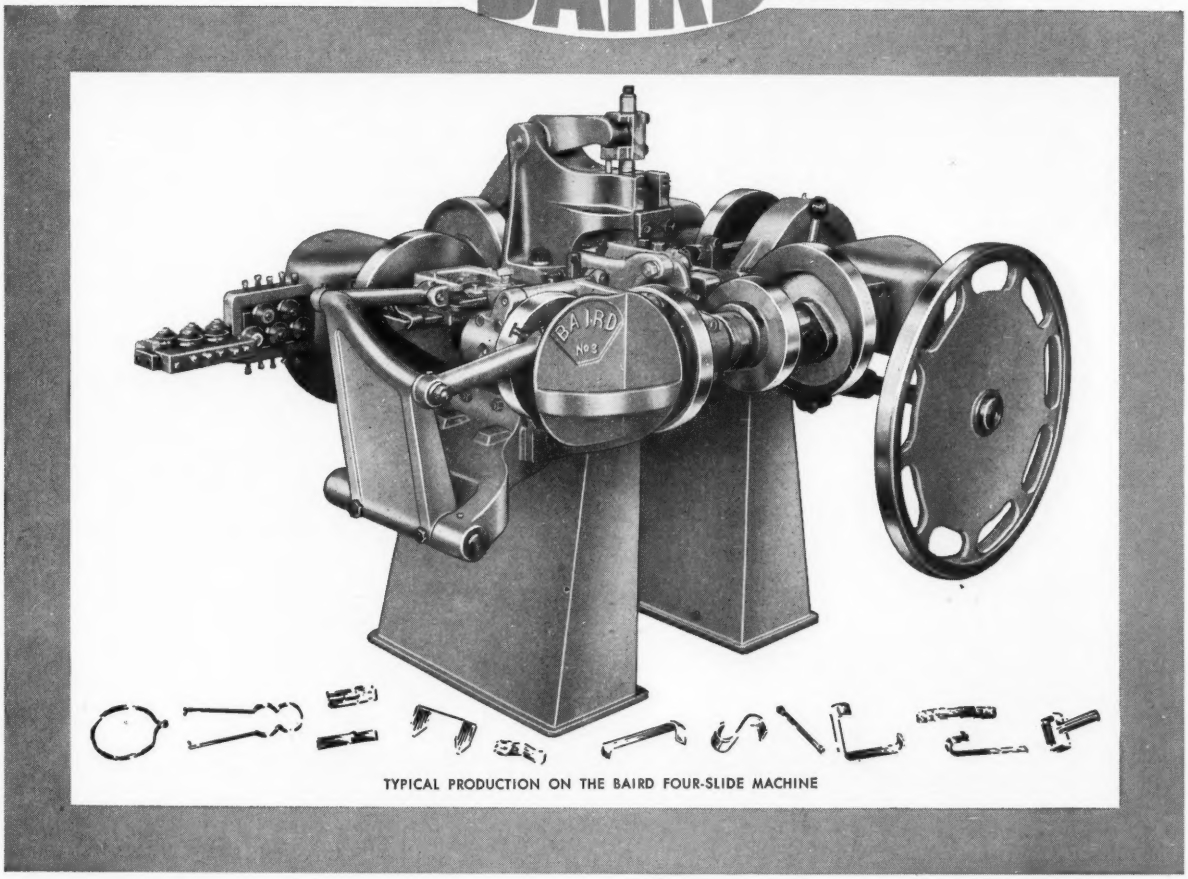
Ask for Booklet B-100

A-9417

INDUSTRY AND KENNAMETAL ...Partners in Progress



...ask BAIRD about it



TYPICAL PRODUCTION ON THE BAIRD FOUR-SLIDE MACHINE

The "hidden bargain" in a BAIRD Four-Slide

Thousands of Baird Four-Slide users . . . making everything from auto seat springs to bobby pins . . . say it isn't hard to find.

The "hidden bargain" is the cost-reduction know-how that goes along with every machine sold.

Baird pioneered the four-slide machine as the basic round and ribbon wire forming equipment used by every industry making such products. Baird has the most extensive experience files on tooling for this most versatile of high production equipment. Usually the problem that seems tough to the customer can be matched to a previous successful Baird application . . . thereby saving time and money in tooling.

With such a reservoir of past practical experience to draw upon, it's always good business to "ask Baird about it" when a four-slide application is being considered. Our range of standard automatic wire forming machines is complete, from the "bench top" No. 00 (400 lbs.) to the "room size" No. 8 (12,000 lbs.) . . . also two standard sizes of ribbon metal forming machines. Bulletin on request. Write Dept. WP.

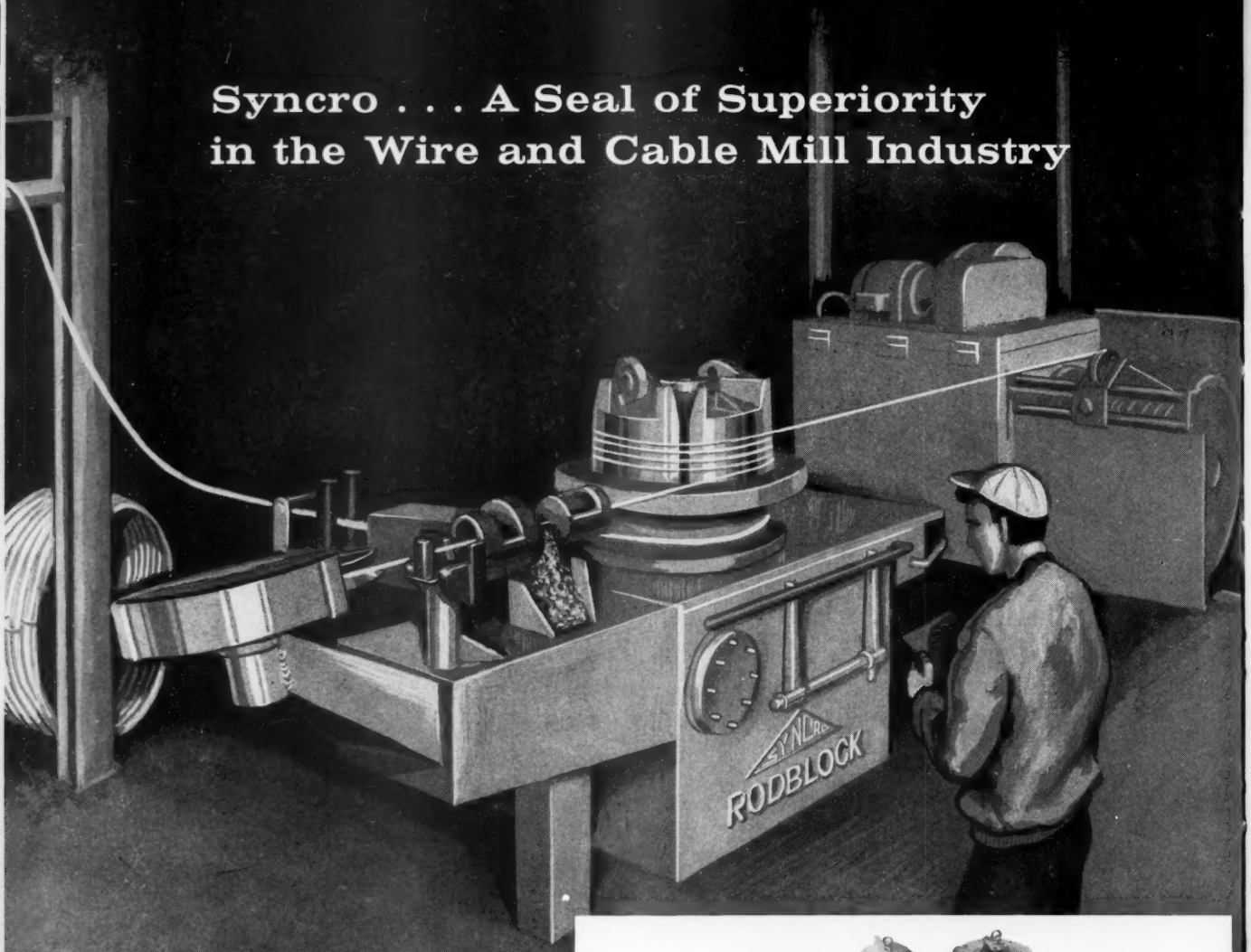
AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

THE BAIRD MACHINE COMPANY

STRATFORD CONNECTICUT

1BA56

Syncro . . . A Seal of Superiority in the Wire and Cable Mill Industry



In the industrial world, higher production and greater profits govern progress. And with this formula Syncro closely governs the design and manufacture of all its products for the wire industry. THE DOUBLE DECK RODBLOCK FEATURING A ROD SHAVING ATTACHMENT is but one example of a long record of leadership as Syncro continues to set the pace on wire and cable mill production lines around the world. Immediate detailed information on the Double Deck Rodblock and all Syncro machinery upon request.

Syncro Machine Company

SYNCRO

Better Machinery for the Wire Industry

PERTH AMBOY, NEW JERSEY, U.S.A. AFFILIATED COMPANY: WINGET SYNCRO LTD. ROCHESTER KENT, ENGLAND

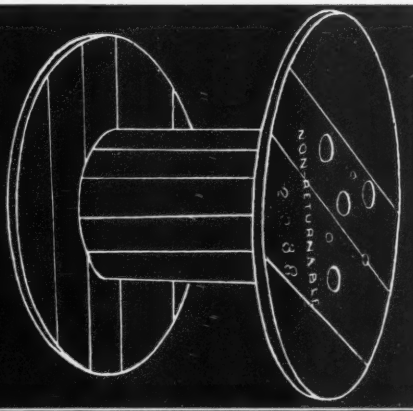
WIRE DRAWING MACHINES • DIE STRINGERS • CONTINUOUS ELECTRIC ANNEALERS • PAYOFFS • CAPSTANS • WIRE INSULATORS • HEAVY DUTY TAKEUPS • TAPERS • SPECIAL MACHINERY

Three TO MAKE MONEY

the NARCO NON-RETURNABLE

- AN EXPENDABLE PACKAGE
- LIGHT IN WEIGHT

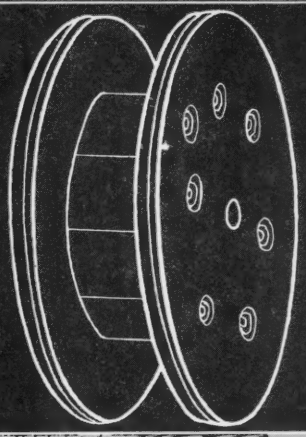
LOW IN COST
NO MAINTENANCE



the NARCO METAL BOUND

- THE QUALITY REEL THAT **LASTS** AND **LASTS** AND **LASTS**
- **FOUR** TO **SIX** TIMES THE LIFE OF ALL WOOD REELS

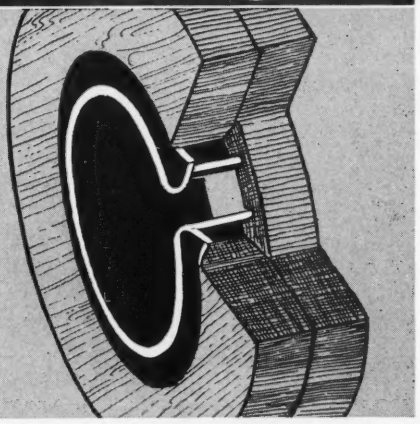
NO MAINTENANCE



the NARCO SPLIT BUSHING

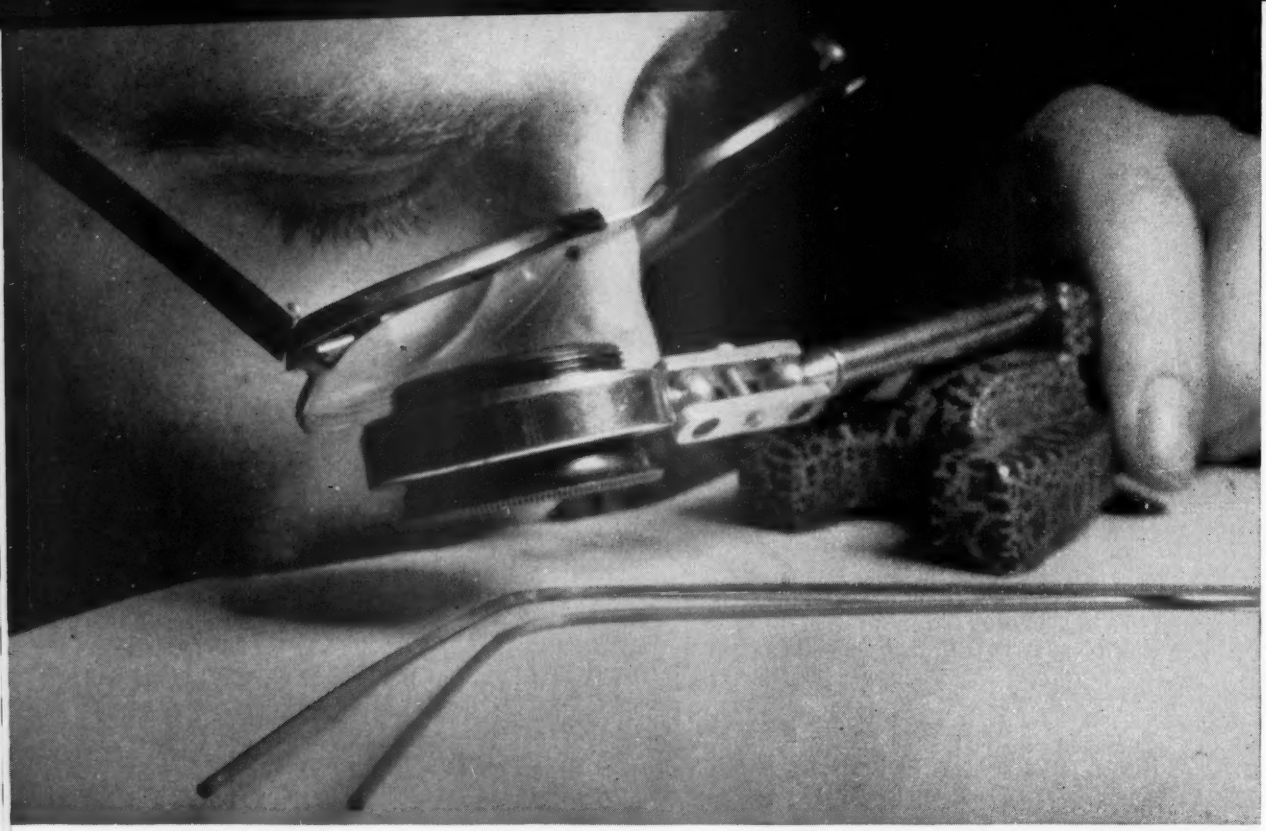
- REPLACES COSTLY HUB PLATES AND CASTINGS

LOW IN COST
NO MAINTENANCE



Remember These are products of the most modern up-to-date reel plant in the world. Manufactured by a company with nearly 50 years experience and a background of exhaustive testing and research in the laboratory and the field.

• • • • MAKERS OF REELS SINCE 1909 • • • •



The Connecticut Spring Corp. imposes rigid standards which Johnson Steel & Wire Co.'s Music Wire meets.

They Use Electronics To Build Steel Springs

Connecticut Spring Corporation Uses Johnson Music Wire To Do "The Impossible"

Photo shows 97 springs on a dime with plenty of room to spare, illustrates why The Connecticut Spring Corp. has introduced electronics into production.

What was long considered impossible in the intricate manufacture of precision steel springs—use of electronic production controls—is being done daily in the Hartford plant of The Connecticut Spring Corporation.

Electronics are being used in production of one spring so small that 100 of them fit on a dime easily.

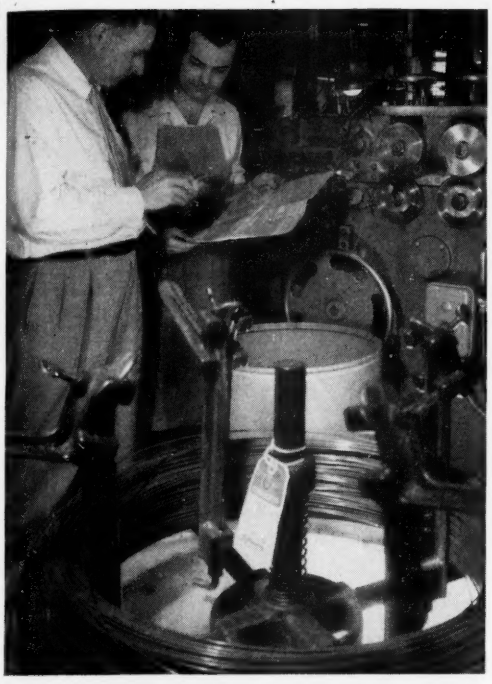
Electronic devices are doing several production jobs for The Connecticut Spring Corp. to protect the company's reputation for quality.

But electronics, as company officials will quickly tell you, only measure quality, not create it.

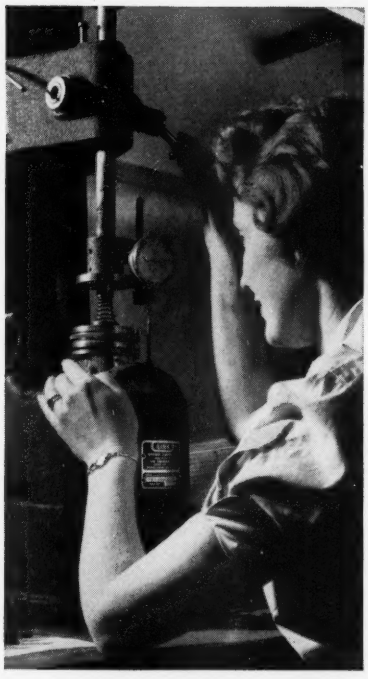
Quality in a steel spring starts with the wire. That's why Connecticut Spring, one of the largest specialty fine wire users in the East, has been a Johnson Steel & Wire Co. customer since starting business 20 years ago.

"Our experience with Johnson wire has been satisfactory in every respect," says John A. Torda, general sales manager.

Electronic scanning of springs too



John Torda, sales manager, left, checks drawings to see that spring being wound meets specifications.



Numerous quality tests are performed on the aircraft spring to insure that it can perform its vital function in plane's fuel system.

Pittsburgh Steel's hard-drawn MB wire is used by Connecticut Spring for cellar door counter balance door spring. Here wire gets two bends.

Three coils are wound into each side of spring. Pittsburgh Steel has been major supplier for this product since production started.

Ready for installation. Tensile strength of wire (Pittsburgh's .218) is vital. Connecticut Spring has no complaints on wire quality.

small to be measured manually is just one precaution the company takes. Its toughest job—a precision compression spring for the carburization system of a reciprocating aircraft engine—illustrates the firm's exacting emphasis on quality.

This aircraft spring weighs only half an ounce but controls the fuel flow in the engine.

The spring is tapered from a top O.D. of 1 inch to a bottom $\frac{5}{8}$ inch O.D. Free length is $1\frac{1}{2}$ inches with $8\frac{1}{2}$ coils. Made to Aircraft Material Specification 5112, the spring uses Johnson's .090 Music Wire.

Johnson conducts its own rigid inspection before shipping from its Worcester, Mass., mill to certify the wire meets AMS demands.

Connecticut Spring could get by on this certification. Instead, it conducts its own complete test of physical properties and then trial runs a sample piece of wire from each lot. During production, it runs several inspections, including two load value tests on five different check points.

The aircraft spring goes through heat treating and brazing operations. It must meet precise load specifications, thus its tensile strength must be exact. Specifications permit only one degree of squareness. Load values have a plus or minus tolerance as limited as .003 to .008. A battery of testing devices makes certain these specifications are met or surpassed.

Connecticut buys every size range of Johnson's Music Wire, starting at .003 and going to .300.

For its complete product line, Connecticut relies on both Johnson and its parent Pittsburgh Steel Company. The wire mills of Pittsburgh Steel have become major supplier of hard-drawn MB wire used to make double counter-balance springs for steel cellar doors. Pittsburgh also supplies oil-tempered MB wire for transformer base mounting springs.

Whatever the wire application, Johnson Steel & Wire Company and Pittsburgh Steel Company can serve you. From aircraft cord wire to tire bead wire made by Johnson through oil-tempered, hard-drawn, low-carbon or core wire from Pittsburgh Steel, the team of wire specialists stands ready to serve you. Call in a wire specialist from Johnson or Pittsburgh today for a talk about your wire problems.

Johnson Steel & Wire Company, Inc.

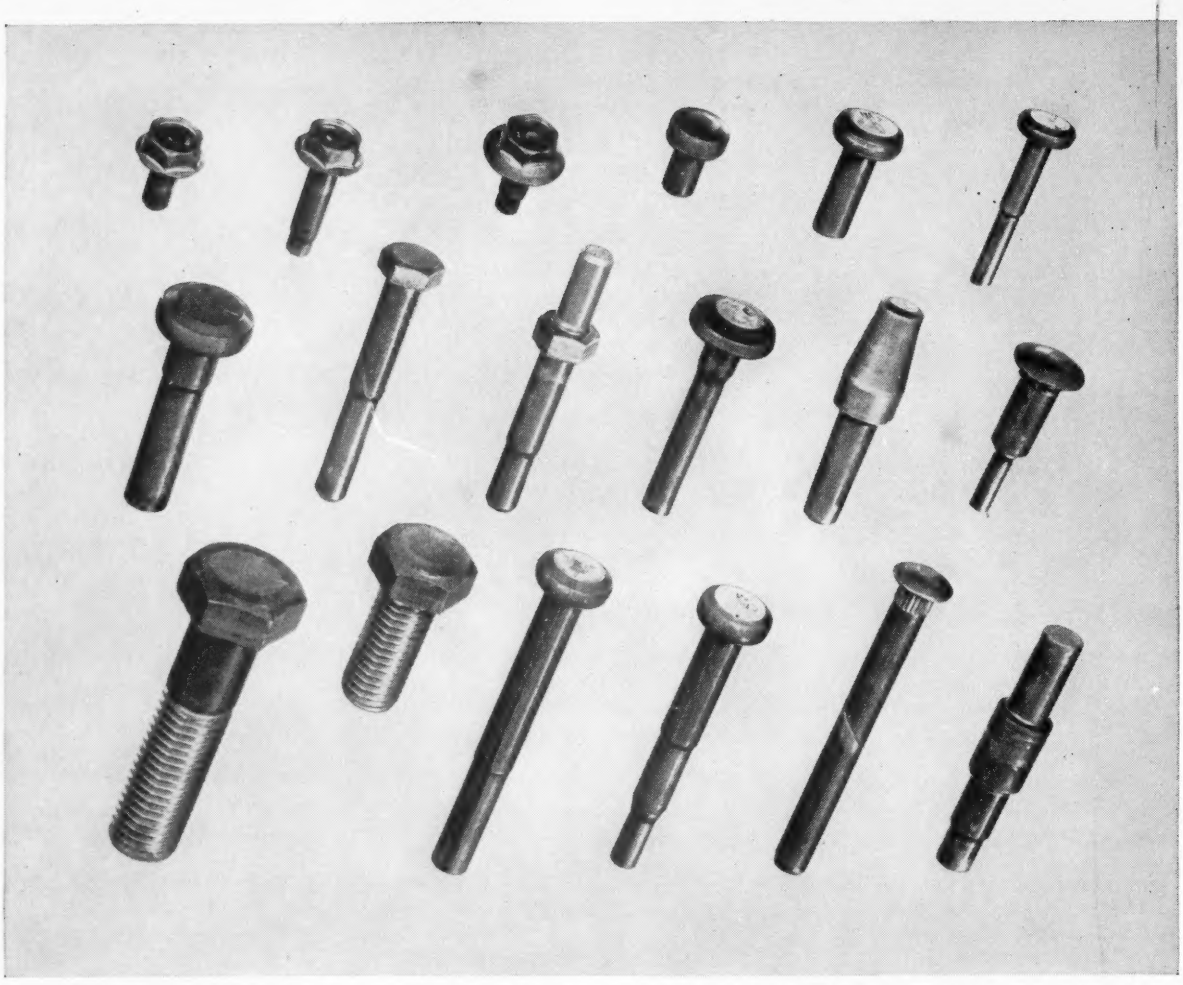
Worcester 1, Massachusetts

***a subsidiary of* Pittsburgh Steel Company**

Grant Building • Pittsburgh 30, Pa.

District Sales Offices

Atlanta	Columbus	Detroit	New York	Tulsa
Chicago	Dallas	Houston	Philadelphia	Warren, Ohio
Cleveland	Dayton	Los Angeles	Pittsburgh	



Is your part illustrated? These are representative of the shapes that can be cold formed more effectively with Granodraw.

GRANODRAW® PROCESS INCREASES TOOL LIFE 2-5 TIMES IN COLD HEADING STEEL FASTENERS

Thorough research, in cooperation with a leading manufacturer of headed fasteners, has proved the value of Granodraw phosphate coating of stock prior to cold working. Typical of the improvement in tool life and in production are the examples shown in the table.

But the advantages do not stop here in cold heading fasteners or cold working other products. This chemical treatment process permits greater speed of draw; greater reductions within the physical limits of the metal; more passes with the same number of intermediate treatments; and the possibility of fewer process anneals. It also results in less downtime of machines, better surface finish on products, cold forming of more complex shapes, fewer rejects, and a cleaner shop.

Write us for complete information about Granodraw and its application in cold forming operations.

PRODUCTION AND TOOL LIFE

PRODUCT	MATERIAL		AV. PIECES PER DIE DRESSING	
	Tool	Stock	Granodraw-Treated	Other Treatment
⅜ x ⅞ rivet	Hardened Alloy Steel	1010 Steel	647,000	180,500
5/16 x 24 flat head shoulder bolt	Hardened Alloy Steel	1010 Steel	26,000	5000-8000
Hex Head Cap Screws	Hardened Alloy Steel	1038 Steel	53,000	13,000-14,000
¼ x 20 Hex Machine Bolt	Hardened Alloy Steel	1018 Steel	28,000	13,000

Note. Although investigations on the life of carbide tools are not completed, one item deserves mention. A 5/16 x 24 hex head shoulder bolt showed a strikingly low carbide tool life of 67,000 pieces per die. Using Granodraw-treated rod, one die produced 105,000 pieces—another 194,000 pieces. And both dies were in good condition at the end of the run.

AMERICAN CHEMICAL PAINT COMPANY, Ambler 30, Pa.

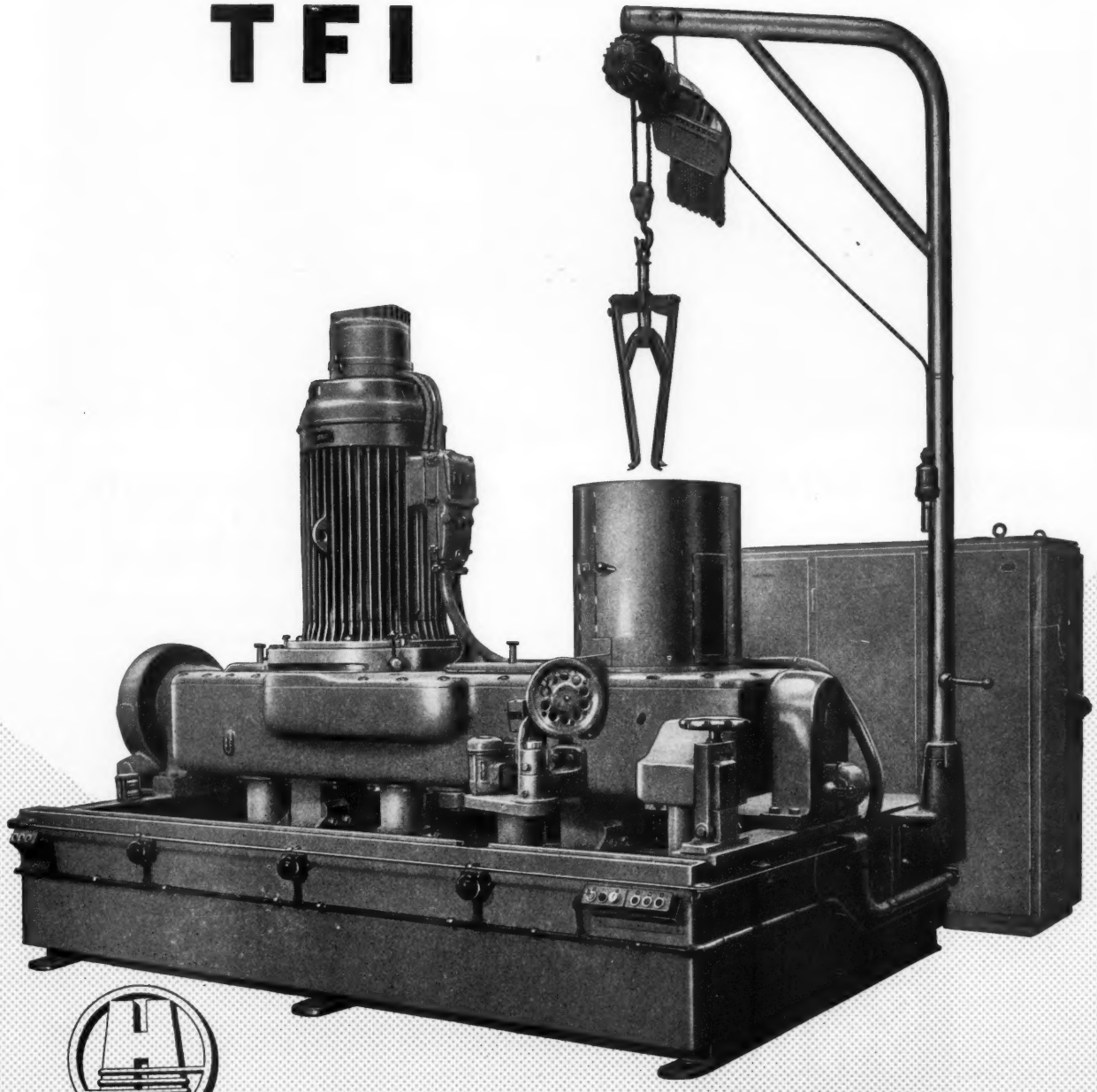
DETROIT, MICHIGAN NILES, CALIFORNIA WINDSOR, ONTARIO

CHEMICALS ACP PROCESSES

HIGH PRODUCTION

is obtained with our

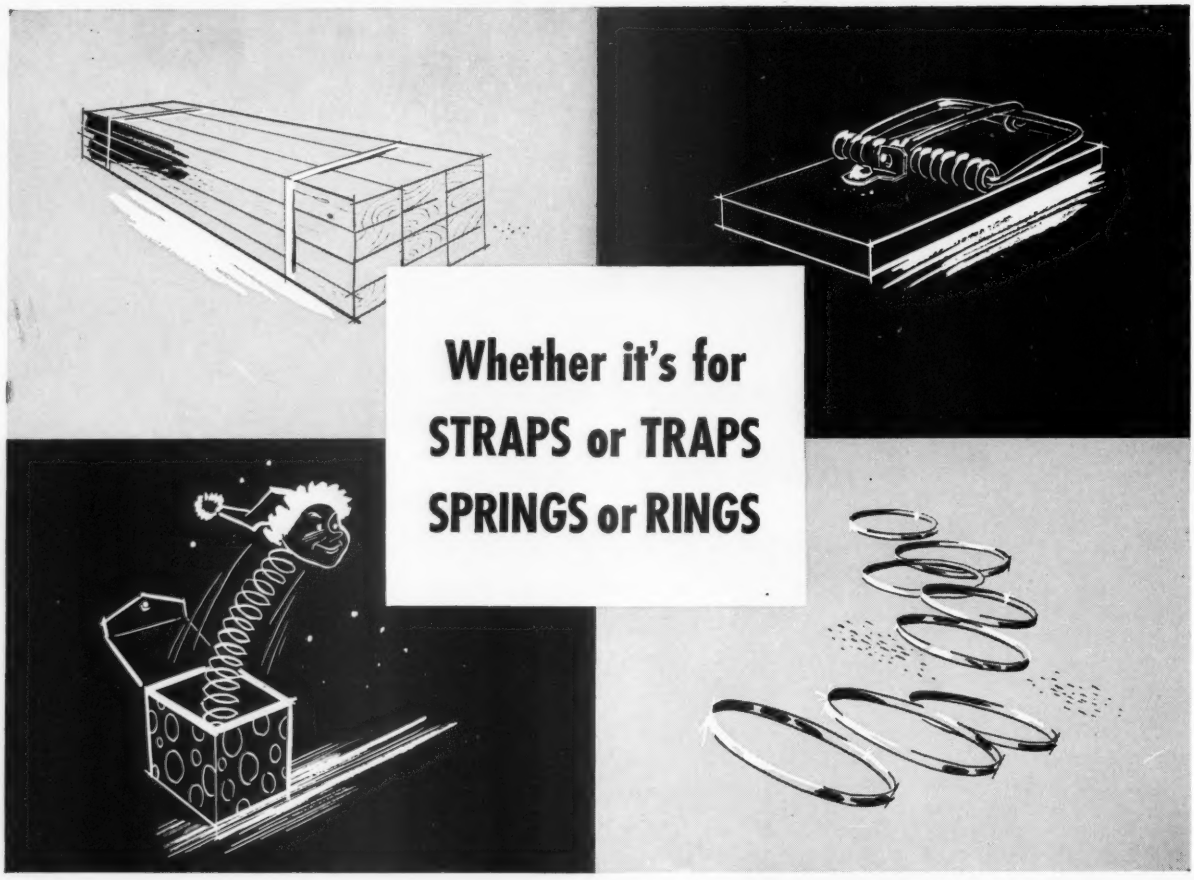
TFI



MASCHINENFABRIK HERBORN BERKENHOFF & DREBES A.-G. **HERBORN/DILLKREIS** GERMANY

Sole Representative in the U. S. A.:

KURT ORBAN CO., Inc., 34 Exchange Place, JERSEY CITY 2, N. J.



SWIFT'S SOAPS are the efficient lubricants for wire drawing

Strategic distribution points throughout the U. S. and Canada can provide prompt, courteous service and immediate delivery on these versatile soaps:

SNAP. Heavy duty wire drawing powder. A neutral 96% soap affords consistently high titer range of 46 to 47° C. For use where exceptionally high temperatures prevail.

NO. 559 POWDER. In solution, will tend to remain fluid and completely free flowing at cool temperatures to afford top protection for wet drawing the finest wire products.

WHITE RIBBON (TALLOW) SOAP. For use at high temperatures where a low moisture, high soap content is desired.

Whether it's used to strap lumber or spring traps, all wire has this in common: speed is profit, but with the efficiency of speed comes the dangers of heat and friction. A compromise with the quality of your wire drawing lubricant at today's pace is a *certain* compromise with the efficiency you purchased in high speed equipment.

Swift's wire drawing lubricants are *efficient* because they are produced from *first choice* raw materials—to standards established through 50 years of serving specific wire drawing needs.

Why not let your Swift's man show you how our expanding line of soaps can help *you* make the most of speed . . . the *least* of heat and stress? Call him today and remember . . .

ONE TRIAL IS BETTER THAN A THOUSAND CLAIMS

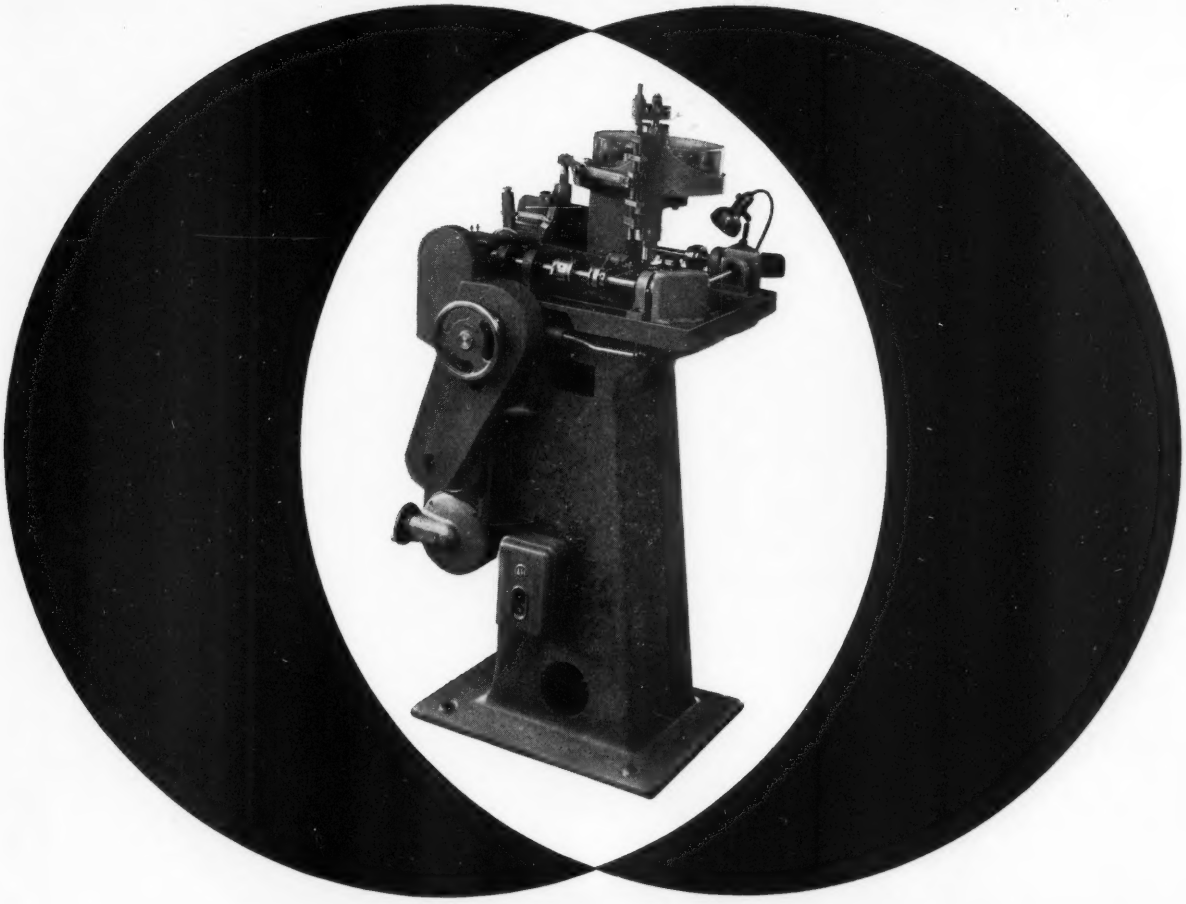
Swift
101 ST YEAR

To Serve Your Industry Better

SWIFT & COMPANY

SOAP DEPARTMENT

4115 Packers Ave. • Chicago 9, Ill.



the new Torrington W3000

...latest addition to Torrington's growing line of torsion spring winders

The W3000 torsion winder is a modern, high production machine with the largest tooling area devised for a machine of its size. Tooling can be simpler and sturdier. Shafts on three sides of the work area permit the use of individual horizontal slides. These, in conjunction with a rugged vertical two-slide, give Torrington's torsion winder unprecedented versatility and flexibility. Many springs which have previously required secondary operations can now be made complete on this torsion winder.

The W3001 torsion winder, companion of the W3000, is identical in advantages and larger in capacity.

Torrington designs, builds and *services* more springmaking machines for the professional springmaker than all other manufacturers combined. Call on Torrington for equipment best fitted to your needs . . . and depend on Torrington for fast expert assistance on springmaking problems.

Normal Rated Capacity:
Up to 10 turns of spindle for .041" wire
Up to 24 turns of spindle for .028" wire
Up to 40 turns of spindle for .020" wire

Production:
25 to 150 springs per minute

Wire Feed:
Short slide feed — 2½"
Long slide feed — 4½"

Maximum O.D. Coil:
¾"

Maximum Spindle Travel:
2"

Horizontal Slide Travel:
¾"

Vertical Slide Travel:
⅝"

Cam Shaft Diameter:
¾"

Height of Wire Line:
44"

Floor Space:
26" x 30"

Net Weight:
1,000 lbs.

Electrical:
⅓ h.p. wired for either 220 or 440 volts, 3 phase, 60 cycle, A.C. Manual starter included.

Standard Equipment:
Light, counter, cutter quill blank, cutter quill stand, arbor adapter blank.

THE
TORRINGTON
MANUFACTURING COMPANY
TORRINGTON · CONNECTICUT

WIRE MANUFACTURERS...

Coulter & McKenzie
Draw-Pak
Model 227 shown

CUT PRODUCTION COSTS, INCREASE SALES WITH

Jal-Pak

THE NEW *SERVICE-PROVED* J&L WIRE PAIL

Count these J&L Jal-Pak advantages that add up to customer satisfaction and increased sales for you:

- Advanced design featuring a rolled smooth side seam available only in J&L Jal-Pak
- Protection in shipment and storage that only steel can offer
- Smooth interior surfaces that prevent damage to wire
- Rigid cylindrical cores of steel or fiber for trouble-free packaging and dispensing
- Lower investment—no deposit—no return
- Colorful decorations that "sell" wherever your product is seen

Jal-Pak Wire Pails are designed with your production problems in mind. Jal-Pak is a natural receptacle for use in line. It is easily adapted to any reel-type winding machine—single or multiple head—and saves you money through:

- Reduced downtime—no rethreading, replacing or rejoining is necessary
- Optimum winding speeds for the wire producer due to longer continuous lengths in Jal-Pak
- Increased productivity of men on the line
- Reduced in-plant handling operations

Jal-Pak Wire Pails are suitable containers for most types of wire including brass, copper, steel, aluminum, stainless steel, alloys and resistance, welding and soldering.

You can start packaging your wire in Jal-Pak *now*. Quotations will be made immediately. Delivery is guaranteed in two weeks.

For complete information on how Jal-Pak can increase production and sell more wire for you, contact your nearest J&L representative or write direct to our Container Division.

Jones & Laughlin
STEEL CORPORATION · PITTSBURGH
Container Division
405 Lexington Avenue, New York 17, N. Y.

Demonstrated in the laboratory

proved in the field

Du Pont ALATHON® POLYETHYLENE RESIN has 27% superior abrasion resistance

Superior abrasion resistance is one important reason why "Alathon" polyethylene resin gives outstanding performance as an electrical jacketing and insulating material.

The extra toughness and durability of insulation and jacketing of Du Pont "Alathon" were dramatically demonstrated in the laboratory by means of a scrape test. A reciprocating blade set perpendicular to the jacketing abraded ordinary polyethylene from the conductor after 341 cycles. Under the same conditions, the wire jacketing of "Alathon" withstood the blade action through 433 cycles—an increase of 26.9%. Final proof, of course, comes in the field where "Alathon" provides more years of trouble-free service.

In addition to superior abrasion resistance, "Alathon" features low power loss and low dielectric constant, flexibility even at extremely low temperatures and outstanding moisture, chemical and heat resistance.

Not only are the inherent properties of "Alathon," in general, ideally suited for wire and cable insulation, but a number of special compositions of "Alathon" have been developed for specific applications. It will pay you to investigate the unique properties of "Alathon" for your wire and cable insulation and jacketing requirements. To get complete property and application data, clip and mail this coupon.

There is a difference in polyethylenes . . . insist on insulation and jacketing of ALATHON®

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department, Room 705, Du Pont Building, Wilmington 98, Delaware

In Canada: Du Pont Company of Canada Limited, P. O. Box 660, Montreal, Quebec.

Please send me complete information on Du Pont "Alathon" polyethylene resins. I am interested in evaluating these materials for

_____

Name_____

Position_____

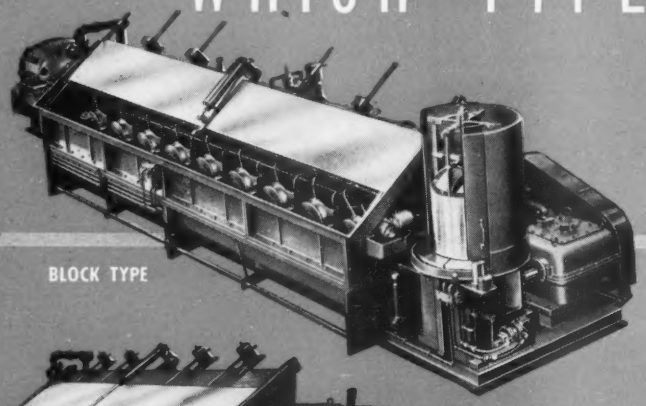
Firm Name_____

Street Address_____

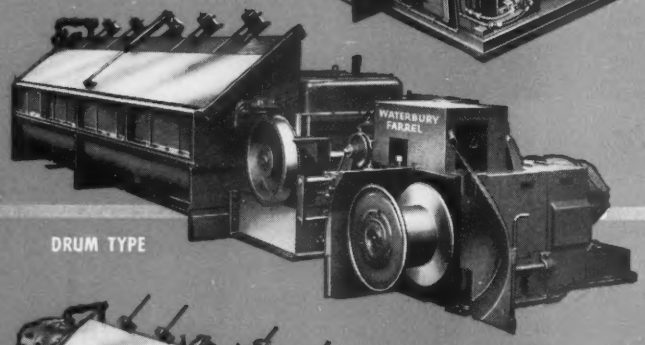
City_____ State_____

Type of Business_____

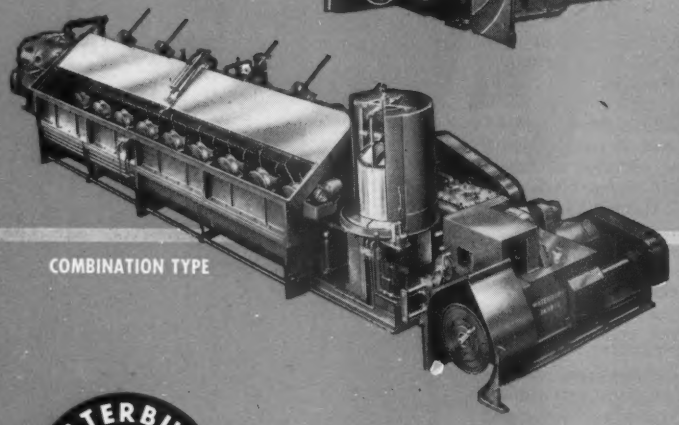
WHICH TYPE



BLOCK TYPE



DRUM TYPE



COMBINATION TYPE

OF WF TANDEM CONTINUOUS WIRE DRAWING MACHINE IS RIGHT FOR YOU?

★ In all three types, Waterbury Farrel *custom-engineers* individual machines to specific requirements for high speed continuous drawing.

★ Each WF machine is backed by over 60 years of experience in designing and building tandem machines.

★ Rugged, precision construction throughout, assures smooth, efficient operation.

WATERBURY FARREL FOUNDRY & MACHINE CO.
Waterbury, Conn. U. S. A.
Branch Offices: Chicago, Cleveland, Millburn, N. J.

WF-27

WATERBURY FARREL FOUNDED 1851

Bolt & Nut Machinery

Power Presses

Rolling Mill Machinery

Wire Mill Equipment

Sendzimir Mills & Special Machinery

SEND FOR YOUR FREE COPY OF THIS NEW 8-PAGE BOOKLET ON WF TANDEM MACHINES.

Covers frames, dies and drawing rolls, driving mechanism, lubrication, packaging and accessory equipment. Gives table of specifications for two sizes. Use coupon or write on letterhead today.

WATERBURY FARREL FOUNDRY & MACHINE CO., WATERBURY, CONN.
Please send me my free copy of your circular No. 786-W-3 on Tandem Wire Drawing Machines.

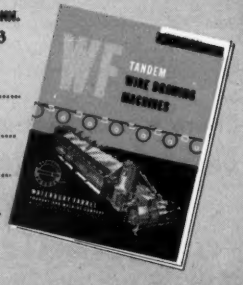
Name.....

Company.....Title.....

Address.....

City.....Zone.....State.....

☐ Please have representative call.



It's outstanding!

EVERY MANUFACTURER who tries Roebling high carbon flat spring steel discovers the same thing... that this spring steel is absolutely unexcelled for dimensional and mechanical uniformity... for speeding production and cutting down rejects.

You always *pay* for the best when you buy flat spring steel... make sure you *get* it by specifying Roebling. John A. Roebling's Sons Corporation, Trenton 2, N. J.

Empire State Building, world's tallest building.

ROEBLING CF&I

A subsidiary of The Colorado Fuel and Iron Corporation

BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

PERFORMANCE REPORT

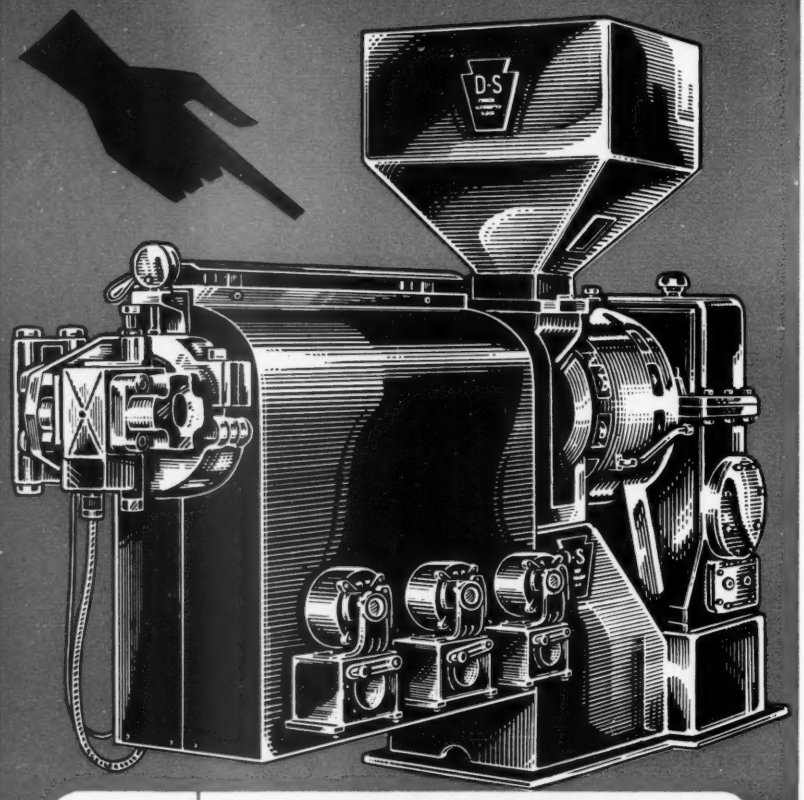
Subject:
RATED CAPACITIES OF THE *THERMA-FIN* EXTRUDERS*

The bore sizes of the standard *THERMA – FIN* thermoplastic extruders* offered by Davis-Standard include 1½", 2", 2½", 3¼", 4½", and 6". For each size, we manufacture a standard model and a super model. The super model of each size contains an extra heat zone along the cylinder, and has a longer stock screw. Consequently, each super model has a greater rated capacity than its standard counterpart.

Tabulated below are the rated capacities of the standard D-S *THERMA-FIN* Extruders* when using polyvinyl chloride and polyethylene. The excellent temperature control system of the *THERMA-FIN* Extruders* makes it possible to produce at rated capacity, *without overheating*, even under the most difficult operating conditions.

For additional data on THERMA-FIN Extruders write to:*

*U.S. Patents Pending



Extruder Bore Size (inches)	Rated Capacity in lbs./hr. (at 90 RPM stock screw speed)			
	Polyvinyl Chloride		Polyethylene	
	Standard	Super	Standard	Super
1½	30	37	25	30
2	70	88	50	62
2½	110	137	80	100
3¼	220	275	160	200
4½	400	500	300	375
6	750	900	550	631

D-S MYSTIC CONNECTICUT U.S.A.

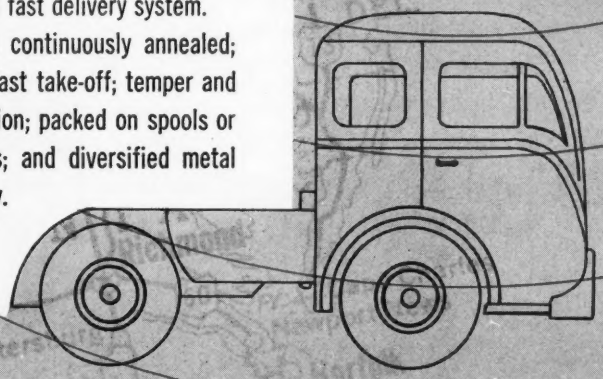
DAVIS-STANDARD
SALES CORPORATION
20 WATER STREET, MYSTIC, CONNECTICUT

SOLE SELLING AGENTS FOR...THE STANDARD MACHINERY COMPANY, World's Largest Manufacturers of Custom-Built Extruding Machines
IN EUROPE AND THE STERLING AREA, CONTACT FINNEY PRESSES LTD., BIRMINGHAM, ENGLAND

Warren Wire Announces Additional Production Capacity to Supply Insulators and Users of Bare and Tinned Copper Wire with Quality Wire... *Fast!*

Whether it's tinned or bare . . . hard or soft . . . from 8 to 36 gauge . . . we get it to you **within hours** by our own fast delivery system.

Consider these advantages: copper that is continuously annealed; wire that will not stick on reels to assure fast take-off; temper and finish that's perfect for high speed production; packed on spools or drums to meet your specific requirements; and diversified metal sources that guarantees a continuous supply.



WW

WARREN WIRE COMPANY

Plant and Main Office: POWNAL, VERMONT

WEST ORANGE, N. J. • PHILADELPHIA • ATLANTA • CLEVELAND* DETROIT • CHICAGO* • ST. LOUIS • ST. PAUL • PHOENIX • DALLAS SEATTLE • LOS ANGELES* • SAN FRANCISCO • MONTREAL

Manufacturers of Plain Enamel, Nylonel, Formvar, Nyform, Bondvar, Silicone and Teflon Magnet Wire . . . Teflon Hook-up and Lead Wire . . . Tinned, Bare and Bunched Copper Wire.

*Office and Warehouse

Published in the interest of the Soft Drink Canners Association and the canning industry.

No headaches in these drinks!

Eliminate the hazard of broken bottles in your plant by providing your employees the safety and convenience of canned soft drinks.

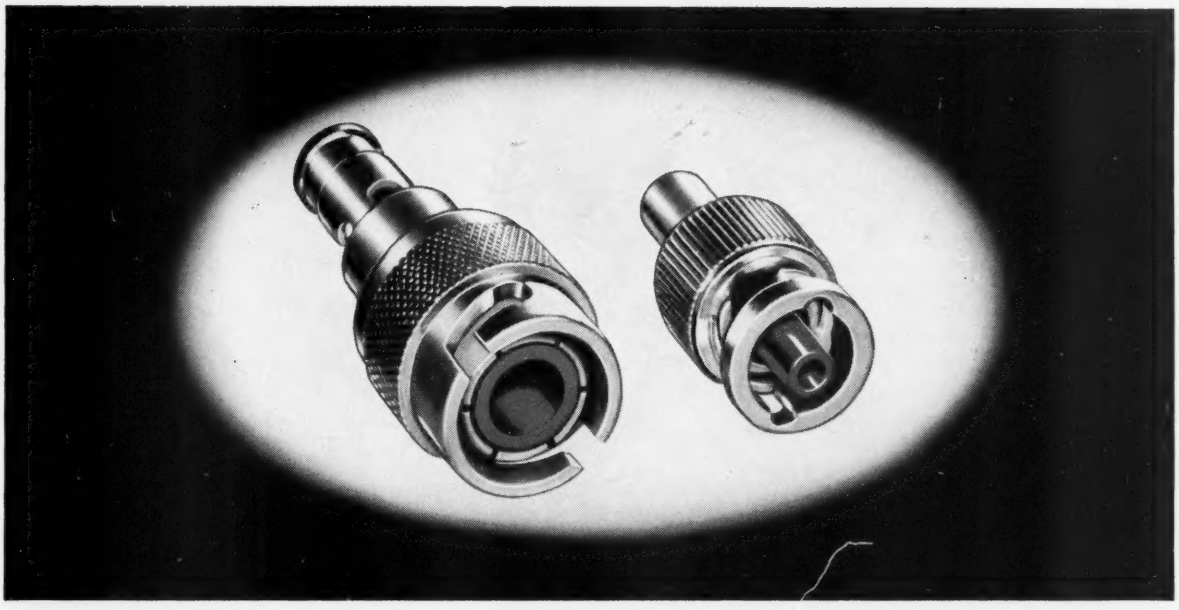
Call your soft drink supplier and learn the many advantages of dispensing drinks the modern way—in cans.

Above are illustrated two of the modern cans for soft drinks, now available for in-plant use.

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices Youngstown, Ohio District Sales Offices in Principal Cities.

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - BLACK PLATE - RAILROAD TRACK SPIKES - MINE ROOF BOLTS



PRECISION CONNECTORS with KEL-F plastic parts have high RF insulation and dimensional stability. Plastic's high impact and compressive strength permit rough handling without chipping, cracking, or deforming. Zero moisture absorption and anti-adhesive surface prevent formation of conductive residue.

KEL-F® FLUOROCARBON PLASTIC

permits components to operate over a wider temperature range . . . under highly humid and corrosive atmospheres

KEL-F plastic's unique combination of properties can help your product meet more rigid performance specifications. Because of the extreme stability of the fluorocarbon plastic molecule, this dense, tough thermoplastic has superior dielectric properties, excellent resistance to corrosive chemicals, outstanding thermal and dimensional stability, and zero moisture absorption.

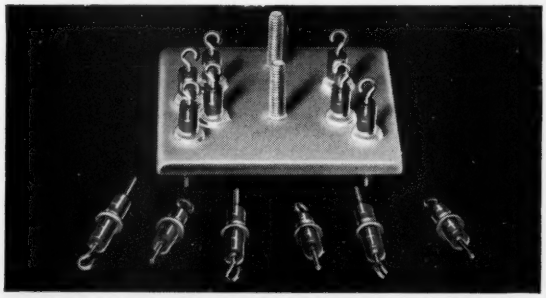
Molded and extruded parts operate over an extremely wide range of temperatures (−320° F. to 390° F.) . . . are unaffected by humidity or operational vibration. Metal inserts, lugs and contacts are held firmly, forming a hermetic seal.

KEL-F plastic is available from Kellogg as a molding material, or in sheets, rods, strips, tubing, film and "spaghetti" from qualified fabricators and molders throughout the country. For further information, write: The M. W. Kellogg Company, Chemical Manufacturing Division, P. O. Box 469, Jersey City 3, N. J.

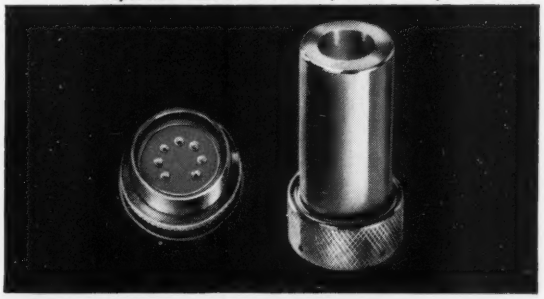
Subsidiary of Pullman Incorporated

® Registered trademark of
The M. W. Kellogg Company for its fluorocarbon products.

Visit the Kellogg Booth #804, 901 Plastics Exposition—June 11-15 Coliseum, New York City



HERMETICALLY-SEALED TERMINALS with KEL-F plastic insulation handle high voltage without flash-over or tracking. Won't shrink, swell, age or lose hermetic seal at high and low operating temperatures. Can be used in contact with highly corrosive chemicals.



TUBE SOCKETS of tough KEL-F plastic. Hermetic seal defies thermal cycling, aging and humidity. Withstands high shock loads without chipping or cracking insulation. Plastic's high dielectric strength prevents shorting or arc-over at high altitudes.

Bonded armored cable, Type ACT, with Opalon-insulated conductors.

Another Monsanto First!

Armored cable with Opalon* vinyl insulation gets U-L recognition!

Opalon improves wiring efficiency—and helps simplify installation!

A new and more efficient armored cable construction has just been perfected. And for the first time cable utilizing vinyl insulation has won recognition from Underwriters' Laboratories.

Builders and electrical contractors will be impressed with the outstanding physical and electrical properties of this cable's conductors which are insulated with Monsanto's Opalon compound.

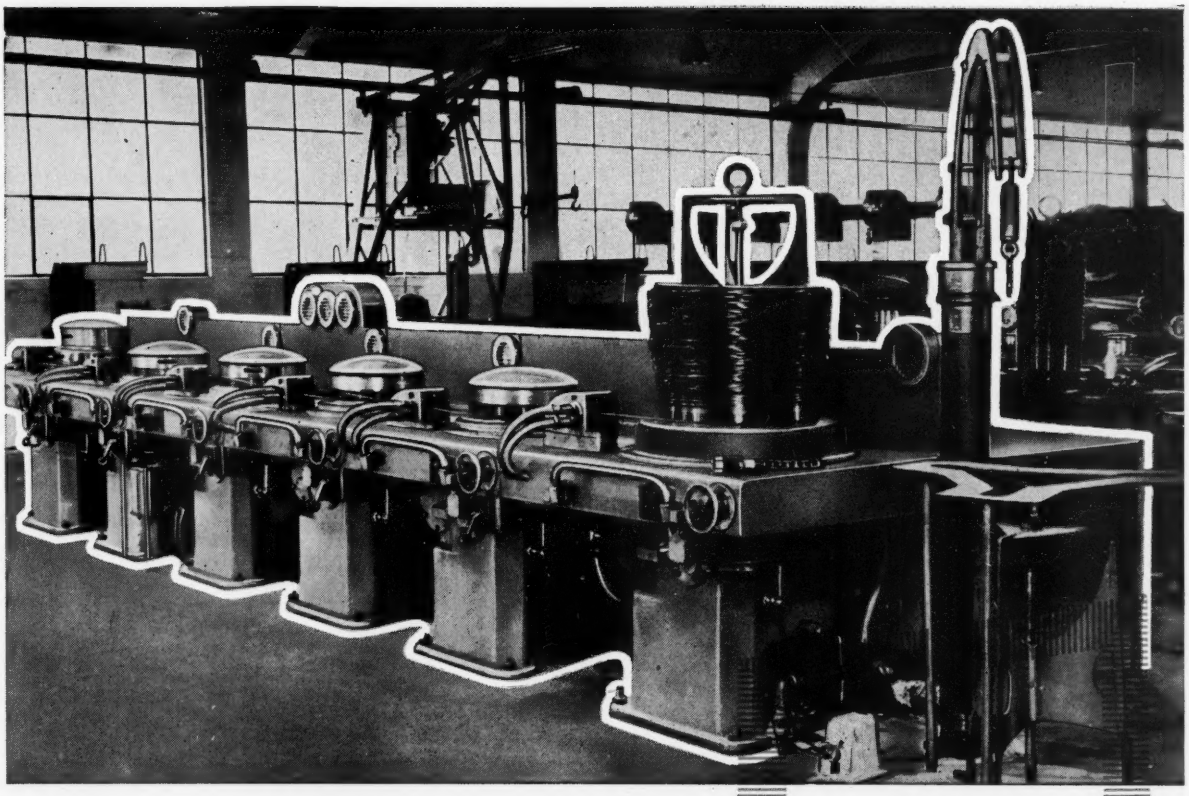
This thermoplastic coating is so tough it reduces the possibility of shorting when wires are pushed over sharp edges in the junction box. Stripping is neater and easier because there is no fraying of the insulation. Color identification is permanent.

This trail-blazing development in wiring was pioneered by three of America's most progressive manufacturers—Columbia Cable & Electric Corp.; Clifton Conduit, Inc.; and Ettco Wire & Cable Corp.—working closely with Monsanto.

For data sheets and complete information on Opalon electrical compounds, write Monsanto Chemical Company, Plastics Division, Room 1120, Springfield 2, Mass.

MONSANTO

*OPALON: REG. U. S. PAT. OFF.



This picture shows a Beeline DG 4, built for an inlet wire diameter of about 7 mm (approx. 2 SWG). High carbon steel.

THE **BEELINE** WIRE DRAWING MACHINE

Straight-line type Wire Drawing Machine for high production of all wire grades

Prominent Beeline features:

- Complete absence of slipping between wire and block.
- Direct block-to-block wire running, with automatic speed control and no loops or other mechanical adjusting devices.
- Continuous speed adjustment from almost zero up to maximum.

Let us help you to solve your problems. We shall be glad to answer your questions promptly. Don't forget to let us know what wire is to be drawn, the inlet and finished diameter, its intended use, the production required, and all other relevant information (tensile strength of the finished wire etc.). Then we can suggest a machine that will be just right for you.

The machine is at present manufactured in three different sizes:

BEELINE DG 5
for heavy wire, about 13 mm. (7/0 SWG)

BEELINE DG 4
for wire rods, about 7 mm. (2 SWG)

BEELINE DG 3
for wire with an inlet diameter of about 3 mm. (11 SWG)

MH

MORGÅRDSHAMMAR

MORGÅRDSHAMMARS MEK VERKSTADS AB • MORGÅRDSHAMMAR • SWEDEN

Cables: Morgårdshammar, Ludvika. Tele: 0240–71100

The New, Revised 1956 Edition of the

WIRE AND WIRE PRODUCTS BUYERS' GUIDE AND YEARBOOK OF THE WIRE ASSOCIATION

is Now Available

Each year this invaluable source-of-supply reference book is a little bigger and a lot better. The hundreds and hundreds of listing changes and additions make the old editions obsolete.

The BUYERS' GUIDE section covers all known sources of supply of bars, rods, wire and wire products, as well as very complete listings of all kinds of machinery and supplies used in the wire industry.

The YEARBOOK SECTION contains lists of officers, directors, committees and members of The Wire Association, a history of Association activities in 1955, a list of authors whose papers have been published in Wire and Wire Products, an index of articles and subjects covered in 1955, and complete lists of Mordica Memorial lectures, Medal Award winners and recipients of Certificates of Honorable Mention—and, the Association's Constitution and By-Laws.

Keep yourself up-to-date on sources of supply and what is going on in the wire industry by sending your order now.

THE PRICE: $5.00

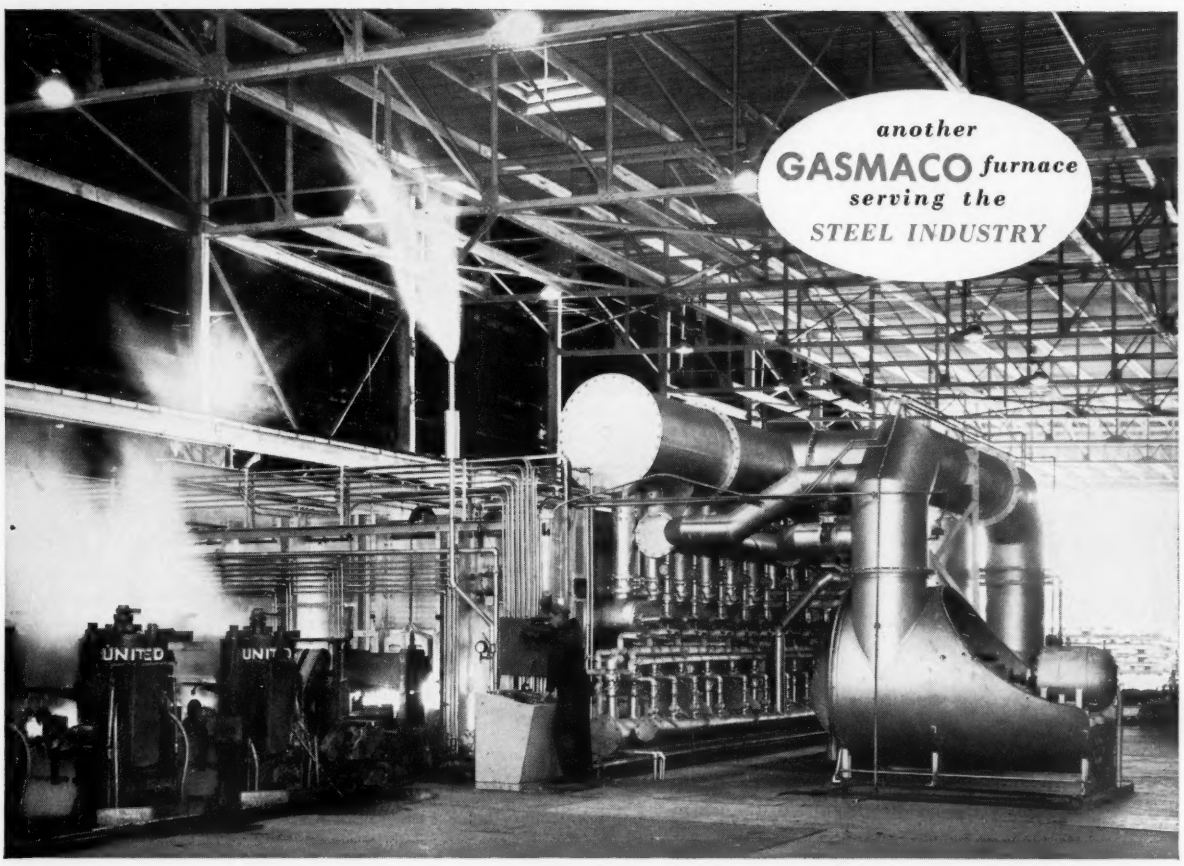
However, if you are a subscriber to Wire and Wire Products, you can buy copies of The BUYERS' GUIDE at a 40% discount—for $3.00.

Members of The Wire Association receive a copy at no additional cost, but may order extra copies at $3.00 each.

Order TODAY from

WIRE AND WIRE PRODUCTS

453 Main Street • Stamford, Conn.



BILLET HEATING

60-ton Furnace at Wickwire Spencer Steel Division, The Colorado Fuel and Iron Corporation

On this Gas Machinery furnace, reverse flowing of spent gases prevents pile-ups at charge end. Gases pass over the billets and back under before being discharged.

Special holding burners eliminate problems normally encountered in resuming operations after a mill delay.

This furnace is supplied with recuperation . . . has modern combustion and control equipment . . . is designed to suit the mill layout.

GASMACO pusher-type furnaces range up to 150 tons — single-zone, double-zone, triple-zone, five-zone. THE GAS MACHINERY COMPANY, 16110 Waterloo Road, Cleveland 10, Ohio. In Canada: The Gas Machinery Co. (Canada) Ltd., Hamilton, Ontario.

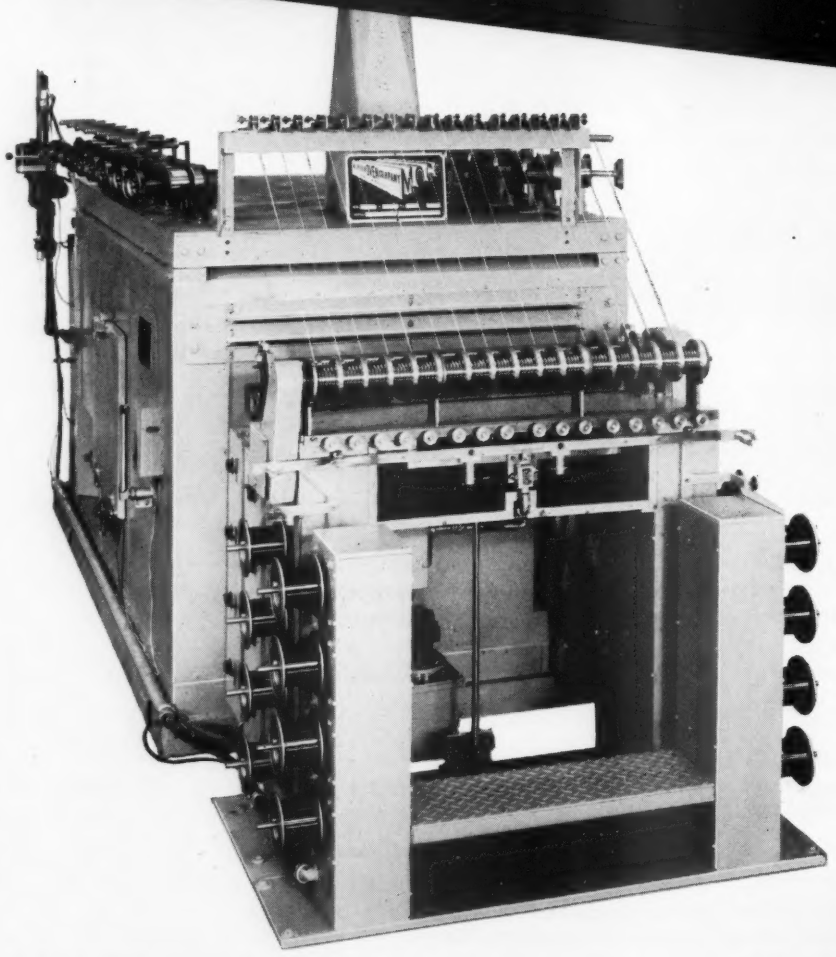
✓ *Check first with GASMACO for latest industrial furnace designs.*

THE **gas machinery** COMPANY

GAS PLANT EQUIPMENT
AND INDUSTRIAL FURNACES

ANOTHER ENGINEERING ACHIEVEMENT BY **MOCO**

Now—A New Wire Enameling Machine That Produces MORE POUNDS OF FINISHED WIRE Per Hour with Commercial Grades of Varnish!



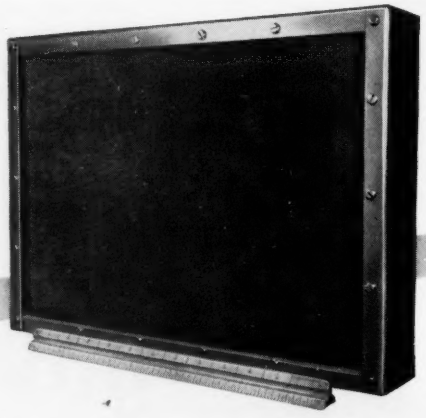
This type "B" wire machine handles wire from 31 A.W.G. to 42 A.W.G. Five other models complete the cycle—from the finest to the heaviest wire. The unique design of the horizontal, high volumetric, recirculating double-pass oven allows greatly increased production by rapid heat impartation and a high degree of temperature uniformity throughout the wire chamber. It is seven feet long inside, with an internal recirculating fan and fume consuming catalyst. The oven can be operated by either gas or electricity.

For the first time, modern recirculating oven features—developed in recent years in the electrical manufacturing field—have been combined with the latest wire handling and coating machinery.

Here's a production capacity example: This machine consistently produces 16 heads of #33 A.W.G. with four or six coats of commercial, oleo-resinous or formvar enamels at wire speeds far in excess of 100 f.p.m.

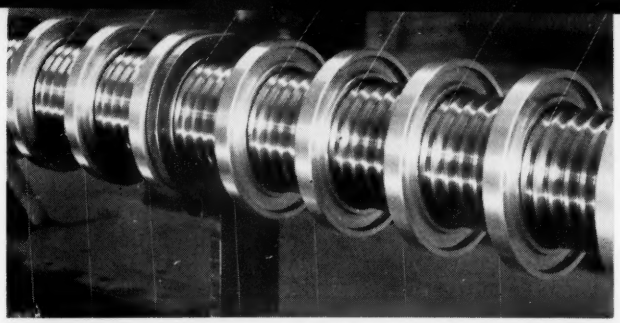
Some of the leading wire manufacturers in the country have seen this machine in full operation in Detroit. They agree: It's a completely revolutionary development in the field of wire enameling equipment.

Here, in picture-caption form, is part of the story. For complete information, fill in the handy coupon on the next page.

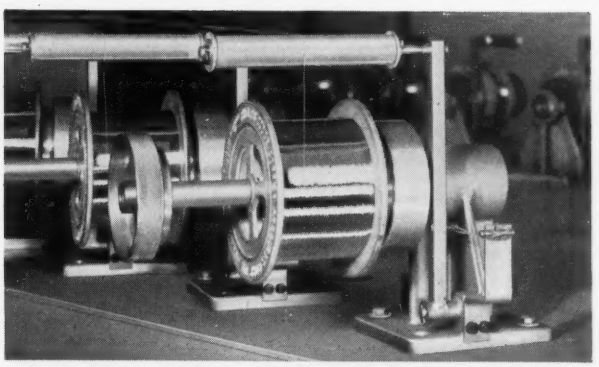


A catalyst is installed within the recirculating stream. Solvents are consumed as they are liberated. They are transformed into usable B.T.U.'s thus reducing the amount of energy from the heat source (either gas or electricity). Results: economy, odor-free exhaust, condensate free stacks, greatly reduced fire hazard.

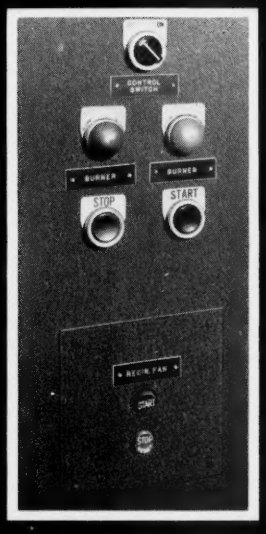
MOCO



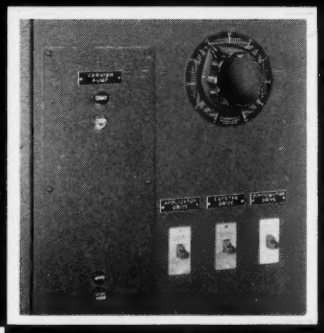
Each head of the wire capstan assembly is fitted with individual clutches at the capstan. Any or all of the lines can be started or stopped without affecting the remaining lines. Each strand is individually driven through the oven, lessening the overall tension applied to each line.



The bare wire pay-off mounts are rigidly mounted at a convenient operational height at the top of the oven. Wire tension is controlled by an automatic braking device.

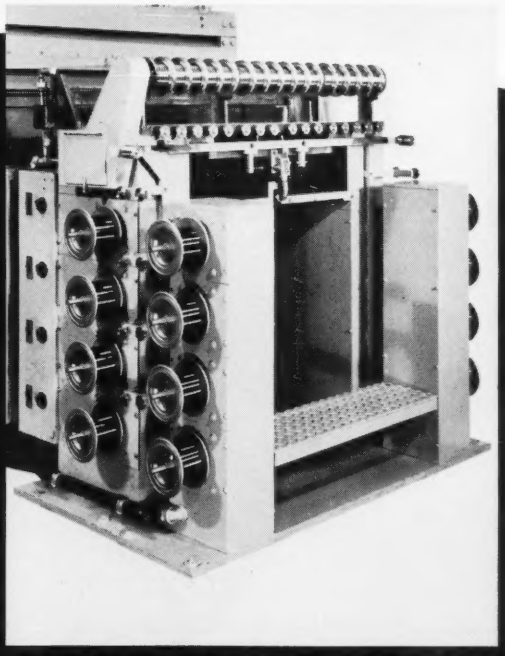


The centrally located, efficient oven control panel makes operating the oven considerably easier. Experienced engineering has incorporated the ultimate in workmanship, simplicity and safety.



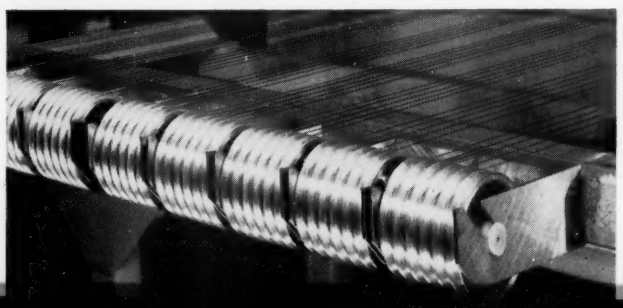
This finger-tip wire control panel brings the capstan and varnish handling equipment into a central point easily accessible to the operator.

Individual torque motor rewinds with micro-adjustment power stats. A simple arrangement of the rewind spools on the console allows easier spool changes even at the high speeds in which the unit operates.



The take-up spools on the unit console are driven by separate torque motors with individual trimmer power stats. All are controlled by a main power stat which also controls a reciprocating wire distributor with adjustable stroke length for laying uniform layers of wire on the spools.

Below: Precision-grooved sheaves with graduated depths of machined aluminum have free-turning nylon bearings.



MICHIGAN OVEN COMPANY

425 Brainard • Detroit 1, Michigan

MOCO

Please send complete information on the new Type "B" MOCO Wire Enameling Machine.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

For the FINEST Dies...

Specify

There Are Many Reasons Why V-R Leads The Field!

V-R NEW Cylindrical nib and improved method of assembly insure high degree of concentricity.

V-R . . . First in producing the only Tantalum-Tungsten carbide developed specifically for Drawing Dies.

V-R . . . First to manufacture Carbide Dies with preformed rough cored back relief.

V-R . . . First to furnish Carbide Dies rough cored to finish at hole sizes below .010".

WRITE TODAY for NEW Vascoloy-Ramet Die Catalog VR-461.

The New V-R Die Catalog gives complete ordering information on all V-R Dies for drawing wire, rod, bar and tube.

Vascoloy-Ramet CORPORATION

886 MARKET STREET

WAUKEGAN, ILLINOIS

The Wire Outlook

There is every evidence that the high levels of business reached in late 1955 will carry through the next few months. It is not likely to go much higher because of capacity limitations, because auto production has been curtailed somewhat and because new housing starts are fewer. For the second half of the year, much depends on the trend of new car orders and a continuation of present high employment levels. Some economists believe that business will increase in the latter half of the year.

Total national income is running 3% higher than last year, which, however, was 8% above 1954. The trend of business in the Fall will have an important bearing on the outcome of the elections, although it is a foregone conclusion that farm incomes will be relatively poor regardless of any farm measure that may be passed. Administration men are optimistic over the outlook, which is not only good for the country, but also favorable to them politically.

Competition will be keen and while we are in something of a boom period, it is not the kind in which just anybody can make a profit. Careful planning, cost reductions and aggressive selling will be needed to keep businesses in the black. The demand for money—or credit—is rising sharply, both for bank loans and long term money in the form of bond issues. The supply of money, however, is being held down by a continued tight-credit policy.

One of the most encouraging signs is the confidence being expressed by consumers. A Federal Reserve System survey has indicated that the consuming public feels it is better off this year than last and that it will be better off in 1957 than now. This is important insofar as it reveals a state of mind that is favorable to the continued absorption of the products of industry. Neither employers or employed apparently expect a slowdown, although business executives must of necessity ever be on the alert for signs of trouble ahead.

Agriculture is the big soft spot. Legislation may check the slide, but will come so late in the year that no turn-up is believed possible. Government spokesmen feel that the farm income position will be better in 1957. In itself the plight of the farmers should not affect the overall situation, unless some other unexpected factor cuts deeply into the business being done by a major industry.

The supply of copper should gradually improve and prices appear to have stabilized at a slightly lower figure. The demand for steel, in spite of auto cut-backs, continues to absorb the mills' capacity. However, two factors are keeping the steel mills busy—increased orders for steel to take care of the normally higher Spring demand for cars and the industry's building of inventories in anticipation of a large demand for the 1957 models, in which many major changes will be made.

Spring makers reduced their purchasing of high carbon wire for automotive springs in March and April, but the slack was offset by an upped demand for furniture springs. Appliance makers and wire formers are keeping the demand for low carbon stock good. Manufacturers wire order backlogs are running about 60 days and the market is strong. Some competition is being felt by Eastern and Southern barbed wire manufacturers from imported goods, the low prices on which is enabling them to reach inland markets. The Spring upturn in merchant wire products has taken place, in spite of price increases on some items.

Machinery sales to our industry should be good this year, paralleling plant expansions and the modernization programs so essential to more efficient production. Constantly rising costs and demands for greater accuracy make much old equipment obsolete. There is a desire too, for greater automaticity to increase man-hour productivity.

1956 is a crucial year in our history. In a major election year and with business at record levels, if we wind up the next eight months without untoward developments, the following period should be less fraught with problems.

—from the Editor's Desk

STEELSKIN

IF *you need a drawing lubricant or a coating compound...*

Whether you need a *powder,* or a *grease* . . . whether it's to be used for *wet* or *dry* drawing . . . you want a *dependable* product.

That's why it's just good business to buy a **STEELSKIN** product. You see, we have just *one* business. We're *specialists* in making wire drawing lubricants. We've learned how — in our many years of specialization — to insure the exceptional performance, the fine, consistent quality of the **STEELSKIN** lubricants we manufacture for you.

What's more, our men in the field . . . the men who call on you, are *specialists* too. They're equipped to help you on any wire drawing problem.

So, when you buy metal working lubricants . . . *why not buy dependability?*

Buy STEELSKIN!

Steelskin LUBRICANTS

R. H. MILLER
Company, Inc., Homer 1, N. Y.

WIRE
AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 31 May, 1956 No. 5

Drawn Shaped Hollow Mandrels

by Robert W. Campbell
Atomic Energy Division
Sylvania Electric Products, Inc.
Bayside, New York

In this article, Mr. Campbell outlines the steps through which company progressed in its efforts to produce a fluted glass tubing for use in specialized electronic tubes, it being essential that the tubing be produced with a high degree of accuracy.

In the manufacture of many specialized electronic tubes, there are a great variety of component parts whose design complicates the manufacturing process. The ultimate usage of some of these parts may not, in any way, affect the purpose for which the tube was designed, but are necessary for the proper alignment, structural soundness, or economics involved. Although existing designs may be obtained from the open market, in many cases, a great deal of development must be done on a goodly number of these parts. Expendable items necessary for the fabrication of these highly specialized units must also be developed and made economically feasible. One of these expendable items and its successful fabrication is described below.

★ ★ ★

The problem presented was to prepare a metallic mandrel economically which could be used to shape a glass tube and then be etched out. The desired shape would be a clover leaf with the radius at the base of the leaves to be at a minimum. The mandrels would be without any curvature over at least a 12-inch length, with no twist in the longitudinal direction of the leaves. These mandrels were to be within a tolerance of plus or minus 0.0005-inches on the radius of a circle drawn tangent to the outside surface of those radii at the base of the clover leaves.

★ ★ ★

When completed, the mandrels are inserted in a glass tube with an I.D. infinitesimally larger than the O.D. of the mandrel. The voids are packed with glass frit or fibers, and the whole assembly is evacuated and sealed off. The glass is then heated to softening, and the inside vacuum causes it to shrink around the mandrel. After cooling, the seal is broken and the mandrel etched out by acid. The resultant I.D. of the glass tube is then of the correct size to insert a tungsten helix which rests on the three points formed by the junction of the clover leaves.

★ ★ ★

Previously, these points had been formed by three rods of correct diameter stacked to form a clover leaf cross-section. These rods were wired at the ends, and the process described above used to form the glass tubes. These mandrels on occasion suffered some separation along the length and glass grit fell in between the rods. The resultant tubes had to be lapped out to corcect size. Th required I.D.'s of the glass tubes ranged from 0.039-inches to 0.064-inches, approximately.

★ ★ ★

The initial thinking towards supplying the mandrels to fill the conditions listed above was to attempt to draw a single rod into the desired clover leaf shape, and thus save both labor and time by eliminating the work of building up the three-piece mandrel. In order to accomplish this, a desirable cross-section was worked out and drawings made.

★ ★ ★

The design of the mandrel was used as a basis for die design and discussions were held with a wire die manufacturer concerning the feasibility of making such a die. It was decided necessary to use a breakdown die and a finishing die

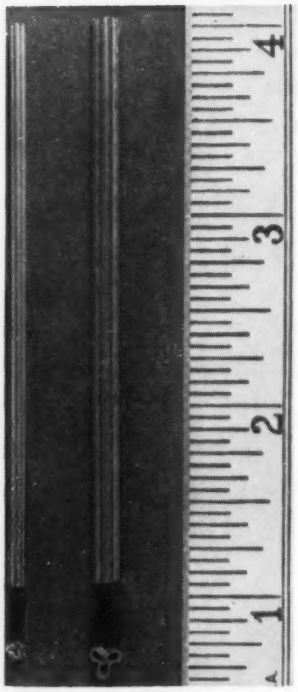


Photo A—Completed Mandrels. * *

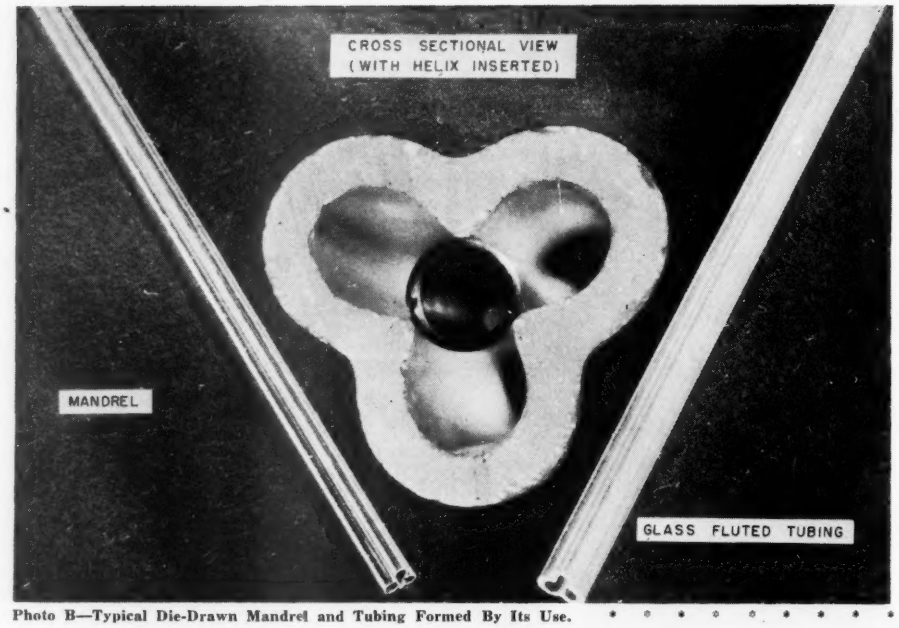


Photo B—Typical Die-Drawn Mandrel and Tubing Formed By Its Use. * * * * * * * * *

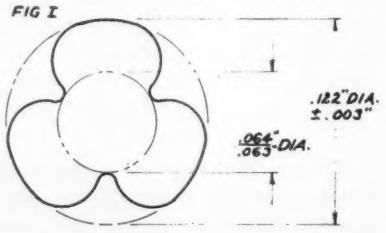
to go from round rod to clover leaf rod. The first attempts after receiving the dies were made on rods of copper, drill rod, stainless steel, cold rolled and Kovar tubing. With the exception of stainless steel, all were successfully drawn to the desired shape. The same lubricant, castordag, was used for all materials. The stainless steel seized in the finishing die after about three or four feet had been formed. All results were gratifying, but the ease with which the Kovar tubing drew caused a re-evaluation of the desired results.

★ ★ ★

Inasmuch as the Kovar has the same relative coefficient of expansion as the glass to be formed, interest centered upon this material. The fact that tubing was drawn so easily also caused us to realize that a tube formed into this configuration would present much more surface for etching out of the shaped glass than would a rod. A great number of techniques were attempted to produce the tubing with the exact dimensions desired.

★ ★ ★

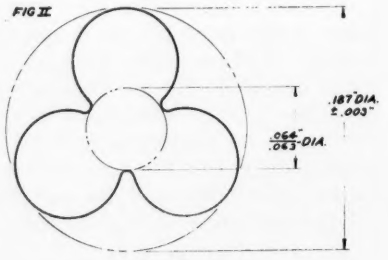
The first material drawn was through dies with a leaf design which was flattened out on the outer extremities (Fig. 1). The dimensions desired were as follows: A circle drawn tangent to the outer edges of the leaves was 0.122-inches ± 0.003-inches in diameter, while a circle drawn tangent to the junction of the base of the clover leaves was 0.063-inches +1/— 0. The leaves were to be centered at 120 degrees from each other giving three-fold symmetry.



Several successful batches of this configuration were made and used as expendable mandrels for the glass tubing production. It was noted, however, that because of the shape of the clover leaves, there was some tendency for the Kovar not to fill up all of the area in the die, and thus not to obtain the designed shape. It was possible to meet tolerances, however, in those areas where it was critical.

★ ★ ★

At this point, a larger outer diameter was desired, once it was proven feasible to prepare the mandrels in this fashion. Learning from the early experience, the next die was designed with the leaves completely circular in shape down to the junction point of adjoining leaves (Fig. 2). In order to have this junction as close to a point as possible, an 0.005-inch ± 0.001-inch radius was specified. The inside diameter of the tangential circle at these junctions is 0.063-inches +1/— 0, and the outside diameter of the extremities of the leaves is 0.187-inches ± 0.003-inches. Again, threefold symmetry was designed into the die.



Several batches of mandrels were made by drawing the tubing cold without any anneal between passes. The mandrel had a tendency to spring back after the pass through the finishing die, thus exceeding our plus tolerance by a mil or so. When an anneal was attempted between the breakdown

(*Please turn to page* 600)

Progress Through Research

by Bruce W. Gonser, Technical Director
Battelle Memorial Institute
Columbus, Ohio

In this article Dr. Gonser points the way to better metals and more economical production through research, noting that while much progress has resulted from empirical experience, a scientific fund of knowledge is a more certain way by which to induce progress and economy.

Recent years have witnessed progress in the wire industry as a result of improved control of metallurgical processes and wire fabrication methods. There still are, however, numerous additional advances to be made through the application of scientific research to the development of wire alloys and wire fabrication.

★ ★ ★

We have secured from research technologists at Battelle Institute some observations on the advances that may be made through research during the next few years.

★ ★ ★

Manufacturers using wire are anxious, of course, to have a material they can count on—one that is uniform in its physical and mechanical characteristics. Two factors known to be important in producing uniform wire are first, homogeneous starting material—the wire bar or even the cast ingots—and second, suitable wire fabrication techniques—processes that yield a product having maximum uniformity. Wire producers feel that both casting and production procedures can be advantageously modified. Of course, over the years many changes in wire production have been effected as engineers have seen their practical utility. Battelle technologists, however, point out that if major advances are to be made in the area of wire production and fabrication, a bulwark of theoretical knowledge must be built to reinforce the empirical knowledge that presently serves as a background for action.

★ ★ ★

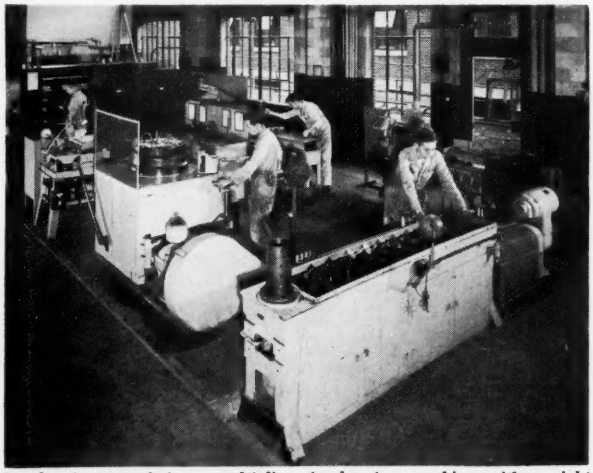
Starting with the thesis that the forces used to shape wire by pulling must be less than the wire's tensile strength, experimentation, possibly supported jointly by the entire wire industry, might be conducted to elaborate on principles of deformation. Immediately, the questions of die materials and die entry and exit angles would be subject to a thorough investigation. Among other things, pulling force and back tension could also be evaluated. With the knowledge gained from such studies, the industry would be ready for even more efficient production "in the years ahead".

★ ★ ★

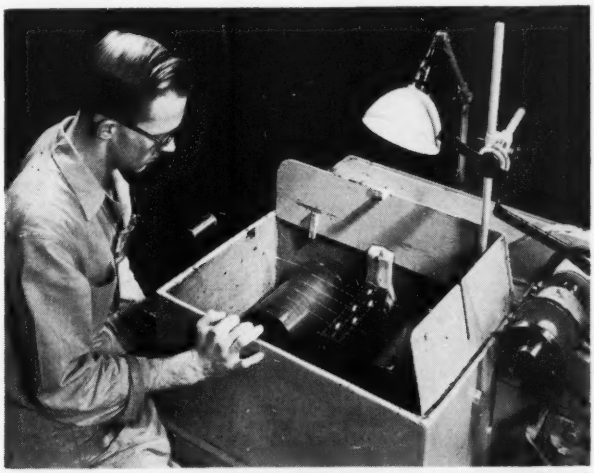
Or, in another vein, fundamental wire research might well be directed toward creation of more direct methods of wire production—methods to replace the present complex system of casting, grinding, rolling, heat treating, lubricating and cleaning. Today, large amounts of time and energy are needed to perform operations that are only indirectly related to wire production, although they are necessary because of the metallurgical techniques used. Looking into the future, drastically revised metallurgical techniques may bring a reduction in the number of such operations and a corresponding increase in productive efficiency.

★ ★ ★

Progress in cold-drawing methods generally, made in research at Battelle and elsewhere during the past 15 years, makes it seem probable that cold drawing of wire specifically would also benefit from further study.



In the foreground is a multi-die wire-drawing machine with upright drums. Also shown are bull block, tub type multi-die wire-drawing machine, and end of a draw bench. Because large quantities of wire are not needed in experimentation, Battelle's equipment operates at speeds slower than those currently used in industrial production. * * *



At the small extreme in Battelle's wire-fabricating equipment is this tub type multi-die machine, which finished wire to .0028 inch from a starting size of .0200 inch. The wire is drawn through a score of diamond dies for its final reductions. * * * * * * * *

Fatigue of metal has been recognized by wire manufacturers as important in determining the flexing life of metal products. Fatigue life is affected by stresses trapped in the metal during fabrication. Battelle technologists point out that by relieving unfavorable stresses and by imparting favorable residual stresses, the fatigue life of many wire products is being increased. Additional research in this field is expected to yield profitable results "in coming years."

★ ★ ★

According to some observers, another development that may result from basic research on metallurgy and mechanics would be new types of extremely high-strength cable and wire rope. Battelle scientists predict that attempts will be made through research to find more economic methods of producing fine wires—below ten mils in diameter.

Lubricants are a subject for continuing wire research, especially as stainless steel and numerous recently developed metals and alloys come into greater use. The more refractory metals, such as titanium, zirconium, and molybdenum, and their alloys, are one group that may benefit from further lubricant research. Much progress has already been made in drawing titanium and a few other metals by using a chemical coating to make lubrication more effective. This suggests that chemical coatings may have similar advantages for a number of metals.

★ ★ ★

Surface preparation does not end with lubrication, as wire processors all know. Research on descaling could also supply useful new information. When scale is removed by pickling, the processor has the problem of disposing of the pickle liquor. Alternative methods of scale removal might eliminate such waste-disposal problems.

★ ★ ★

Of course, Battelle technologists have no crystal ball for making predictions. Problems mentioned above are but a sample of those faced by the wire industry. The list is not all inclusive, for one of the characteristics of research is that it will only partially foretell its coming discoveries—some of the most important ones arrive unexpectedly.

★ ★ ★

A quarter century of growth at Battelle has provided Institute technologists with opportunities to conduct research in numerous metallurgical fields. They have conducted studies in such areas as physical metallurgy, melting practices, alloy development, and high-temperature materials. And during this period, various projects have involved wire drawing. Accordingly, wire fabricating machinery is included in Battelle's $500,000 investment in metal-processing equipment. Institute technologists can start with an ore and carry a project through such stages as producing ingots, forgings, sheets, rods, and wire. Finally, they are prepared to examine their products for such characteristics as mechanical and physical properties as well as metallographic constitution.

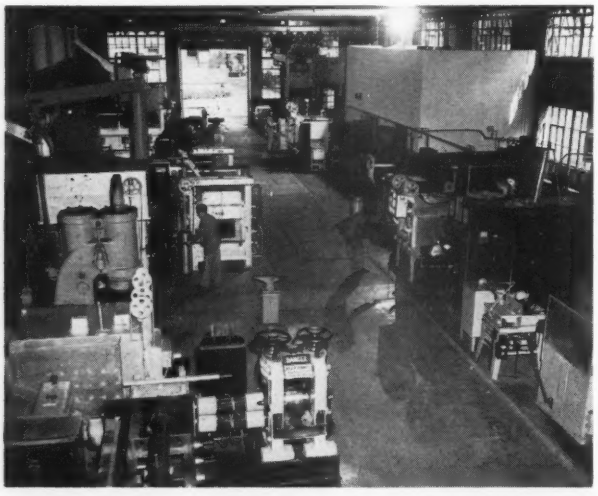
★ ★ ★

Much of Battelle's wire processing occurs as part of alloy development programs. For example, to replace stainless steel in a communications cable, the Army Signal Corps wanted a high strength, relatively nonmagnetic wire that was low in scarce elements. Battelle metallurgists developed an alloy with only 1-2 per cent nickel that had high electrical resistivity and low magnetic permeability; was capable of being drawn into fine wire, and had the other characteristics desired by the Signal Corps. Since drawability was an essential characteristic of any usable alloy for the Signal Corps, a considerable portion of the development program required fabrication on Battelle's wire-drawing equipment.

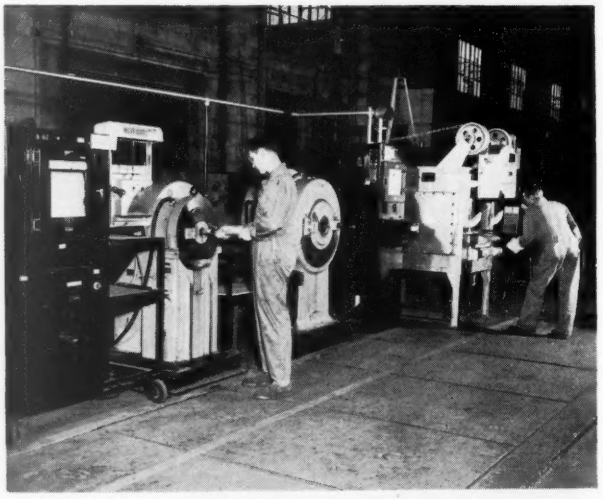
★ ★ ★

Other wire research done at Battelle includes preparation of

(*Please turn to page* 597)



An overall view of one section of Battelle's metallurgical laboratories shows a variety of rolling mills, forging hammers, and heat-treating furnaces—part of a $500,000 stock of metal fabricating equipment used in industrial and government research. * * * * * *



Swaging machines are used in the Institute's laboratories to hot or cold work metals whenever necessary. They can take 3/4-inch rods down to .062 inch. The die sets for swagers and wire-drawing machines are designed to produce 10 per cent reductions in area between passes. * *

Spiral Multicolored PVC Jumper and Switchboard Wire

by Gerard de Senarclens, Vice President and Chief Chemist
Swiss Insulating Works, Ltd.
Breitenbach, Switzerland

This paper was presented at the Signal Corps' Fourth Annual Symposium on Technical Progress in Communication Wires and Cables at Asbury Park, N. J., on December 7, 1955. In it the author describes a method of extruding the coating material in two or more colors on a machine developed by his company, that is now in regular production.

Telephony may be divided into three clearly distinct parts:

(1) **Telephone apparatus as such (microphones, receivers, etc.)**
(2) **Manual or automatic communication systems.**
(3) **Transmission over aerial wires, cable lines and communication apparatus.**

★ ★ ★

In this paper it is proposed to describe some of the recently achieved improvements in wire insulation used in telephone transmissions, notably in regard to distribution wires, switchboard wires and certain cables.

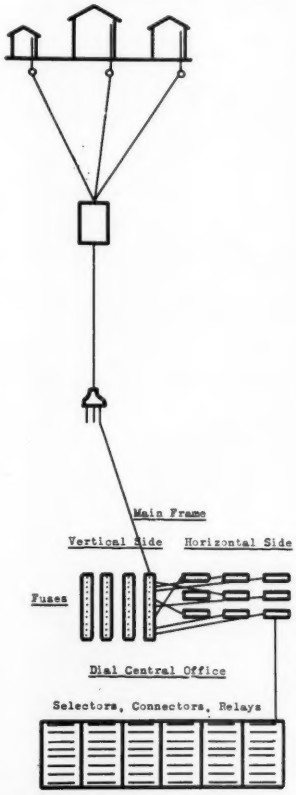
★ ★ ★

The diagram of Fig. 1 represents a telephone network such as may be encountered in Switzerland. It shows that the underground cables are made of wires with paper insulation, protected by a lead sheath, whereas cables used inside buildings consist of wires with PVC insulation, and a protective PVC sheath. Cable L which is used at the entrance of the telephone exchange, is an exception owing to the fact that it is difficult, by splicing, to connect a lead insulated cable with a PVC insulated cable.

The underground cables have undergone little change during the last few years. However, experiments are in progress for the purpose of replacing lead by a plastic compound, chiefly polyethylene. These experiments will undoubtedly continue for several more years. Communication wires, on the other hand, have undergone numerous modifications, as shown on Fig. 2. The changes in the insulation of distribution and switchboard wires have been dictated by the desire to obtain wires which conform to the following requirements:

(1) **Nonflammability.**
(2) **Resistance to humidity.**
(3) **Resistance to mechanical stresses.**
(4) **Good insulation properties, low dielectric constant.**

FIGURE 1 - EXAMPLE OF A TELEPHONE NETWORK



Subscribers: Cable G-51: 2-40 pairs 0.60 mm PVC insulated wire, PVC sheath.

Underground Cable: 2-200 pairs 0.60 or 0.80 mm paper insulated wire, lead sheath.

Distribution Point: Distribution wires V 48

Underground Cable: 200-1200 pairs 0.60 mm paper insulated wire, lead sheath.

Splice

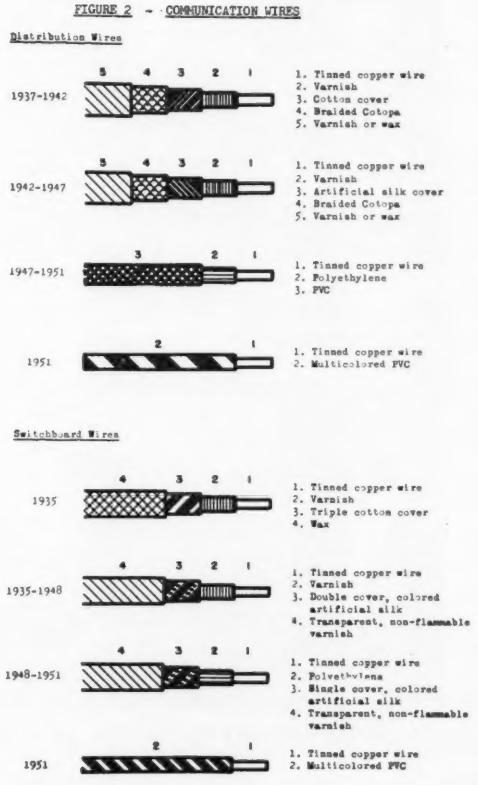
Cable L: 200 pairs cotton insulated wire, lead sheath.

Distribution Wires V 48

Cable Z 49: 20 x 4 PVC insulated wire, PVC sheath.

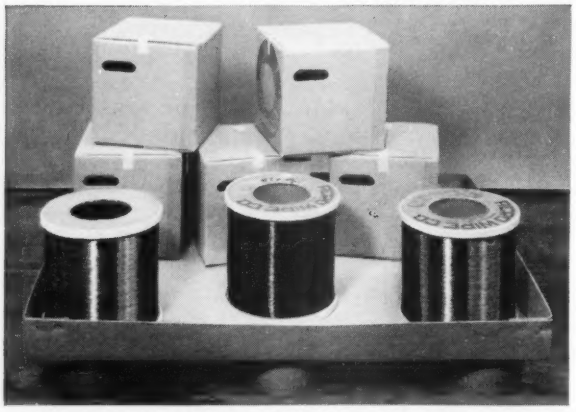
Switchboard Wires M 49: 0.60 mm multicolored PVC insulated wire.

FIGURE 2 - COMMUNICATION WIRES



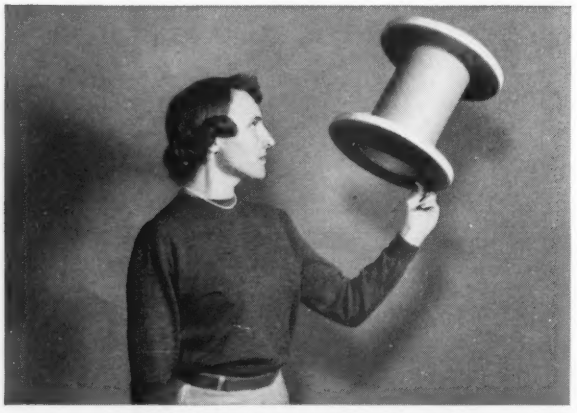
ACROMETAL ANNOUNCES

a revolutionary new low-cost process of packaging wire!

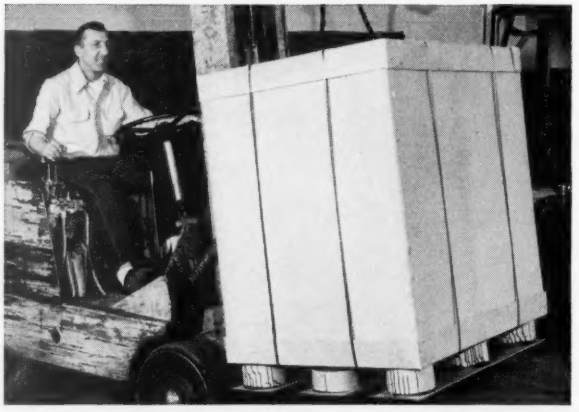


Big packages of fine wire 50# or 100#, pallet packed,

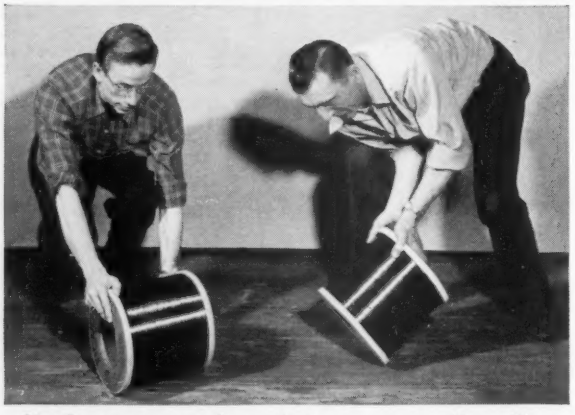
Can now be wound evenly, with minimum spreading, on your present equipment



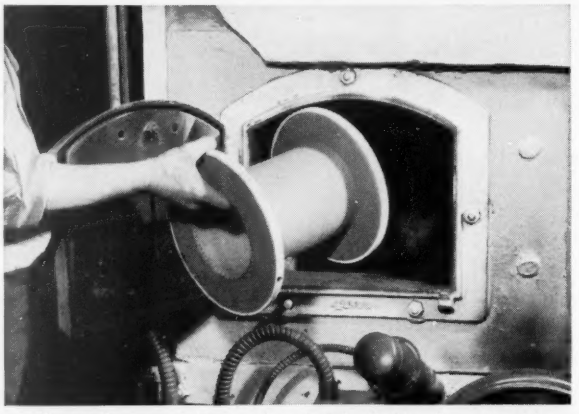
On reels that weigh less than 2 pounds!



Absorbs tough shipping punishment.



No damage, no snarls or wire loss . . . even after rolling or bouncing.



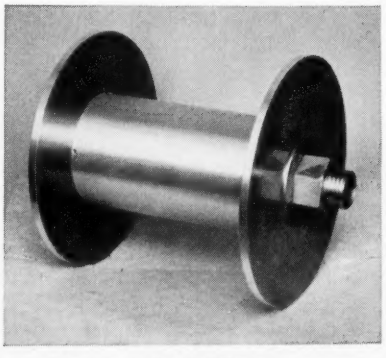
All at a low cost. Burn when finished. No deposits. No return shipments.

Look at these facts...

and figure the money you can save!

1. *Lowest final delivery cost you have ever had... and the least trouble*
2. *Completely disposable... no return freight*
3. *No repair costs*
4. *No bookkeeping... no deposits*
5. *No shipping damage... construction of reel cushions wire on air... absorbs jolts and shocks*
6. *No major production change necessary*
7. *No special skills to learn*
8. *No expensive equipment to buy*

Easier, faster handling by means of these simple aids



ADAPTER

This rigid aluminum jig makes it possible to wind wire under heavy tension on the new disposable reel. End plate slips off by removing nut, reel slides onto cylinder. This provides rigid support. Once wire is wound, it STAYS in position. Easily removable.

HANDLING EQUIPMENT

This is a time and labor saver. Simplifies handling of loaded package both in your plant and plant of your customer. Mere touch of finger swings loaded reel from horizontal to vertical position. Operates in conjunction with power lift.

CARTON

This is the package ready for shipment. Tough, strong, plenty protection. Cube-shaped for efficient stacking. Minimum space. Note handy finger slots for easy lifting and handling.

For further details, write **ACROMETAL PRODUCTS**, Inc., 616 - 5th St. N., Minneapolis, Minn.

(5) **Clear colors that permit rapid identification.**

(6) **Thin insulating walls which can be stripped quickly with a cutting instrument.**

★ ★ ★

It has been recognized for a long time that all of these requirements cannot be simultaneously satisfied by either paper, cotton, cotopa (passivated cotton) or artificial silk insulations. Only plastics of certain stabilized PVC types could serve the purpose, provided that it is possible to permanently color them in a spiral form by coloring the entire volume of the insulating compound. Under constant pressure of the Swiss telephone system, two Swiss factories have studied this problem and have succeeded in solving it. The wires used up to then were found to have, above all, a certain amount of flammability, fair to poor mechanical resistance, and the cover, after stripping the wire for the purpose of splicing, required an application of varnish. Today all distribution and switchboard wires are insulated with PVC. The first are generally of one color, the latter are multicolored with a striped pattern extending spirally throughout the entire PVC insulation. The present specifications call for 9 wires of one color, 31 of 2 colors, and 18 of 3 colors. The manufacture of multicolored wires has begun in several other European countries also, notably in France, Italy, Austria, Great Britain, Spain and Portugal. It is on the point of starting in Germany and in certain Scandinavian countries.

Manufacture of Varicolored Helical Wires

We know that the covering of wire with a plastic sheath takes place on an extruder, a machine consisting ordinarily of an endless screw which mixes and subsequently conveys the hot plastic to the head where it is extruded over the wire to be treated. The beginning of the last world war has seen the advent of equipment consisting of several extruders with endless screws, each of which injects the plastic material into a common head. This procedure resulted in increased production and in more uniform jackets. Moreover, by feeding the endless screw of that machine with colored plastic material, it was possible to obtain a lengthwise pattern.

★ ★ ★

It goes without saying that if the variegated leads are to be wound around the wire in a helix, it is necessary either for the head to revolve around the wire, or for the wire to revolve around itself.

★ ★ ★

The first method, proposed in 1943, was not practical because there is no way of hermetically sealing the parts joining the rotating head and the stationary socket in which it is placed. The melted plastic, whose temperature is in the neighborhood of 170°C, penetrates the joints and may cause the machine to stop after a very short run. In addition to possible loss of pigmenting material, there is also the danger that during the simultaneous intake of plastics of different colors, one color may run into another, resulting in unsatisfactory marking. Certain changes have recently been effected on the machine constructed in 1943. We feel, however, that the weaknesses inherent in the combination of rotating extrusion head and stationary socket are bound to result in production difficulties.

★ ★ ★

In the second method, the plastic is applied by means of a stationary extruding device on the wire revolving around itself. This method has become a practical reality since 1950. The firm of Datwyler, A. G. in Altdorf, Switzerland, has constructed the machine described in Fig. 3. The equipment includes 2 drum holders, arranged in coaxial order on the frame, and set in motion simultaneously by revolving around themselves. One holds the feeding drum, the other the receiving drum. A stationary extruding device is placed on the frame between the two drum holders. This system is the first to have been utilized on an industrial scale.

★ ★ ★

The Swiss Insulating Works, Ltd., Breitenbach, Switzerland, have constructed a machine of an entirely novel design, inasmuch as head and extrusion devices revolve around the wire. This eliminates any joints between the individual parts which, as pointed out above, cannot be sealed hermetically. The drawing of Fig. 4 indicates the important features of that machine, and Figs. 5 and 6 show several machines in operation.

★ ★ ★

The machine includes a turret with projection head, the latter furnished with central passage to accommodate the wire to be coated. The turret is bored to receive geardriven screw conveyors that propel a supply of colored plastic material into the projection head which revolves together with the wheel. Communicating passages and openings at the circumference of the wheel are provided to pick up the various pigmented materials as the wheel revolves, and to direct them to the related lengthwise

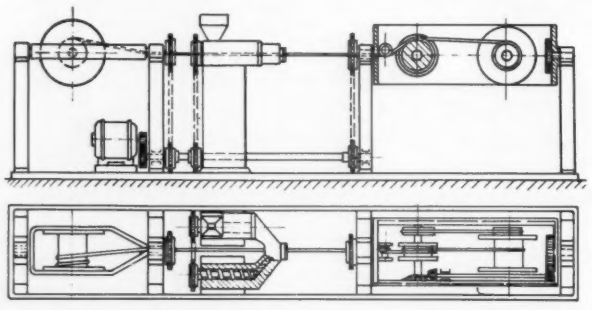


Fig. 3 Profile and plan views of the Datwyler machine. Datwyler A. G. Schweiz. Kabel- & Gummiwerke, Altdorf (Suisse)

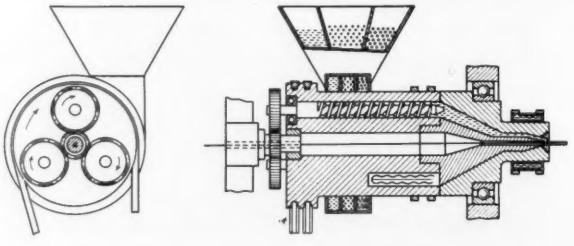


Fig. 4 Cross sections showing details of extrusion machine for producing varicolored helical wire insulation developed by the Swiss Insulating Works. (Drawing from U.S. Patent 2,674,007)

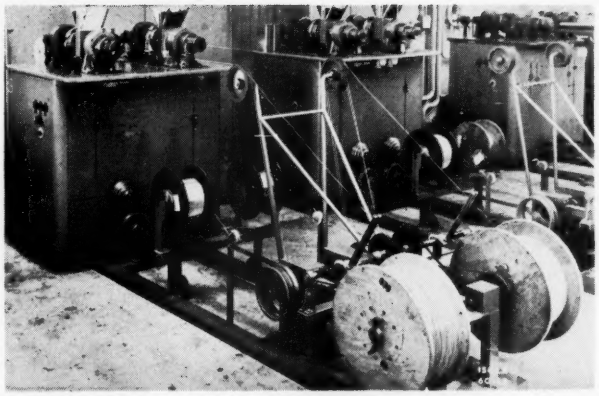


Fig. 5 Swiss Insulating Works machine in operation.

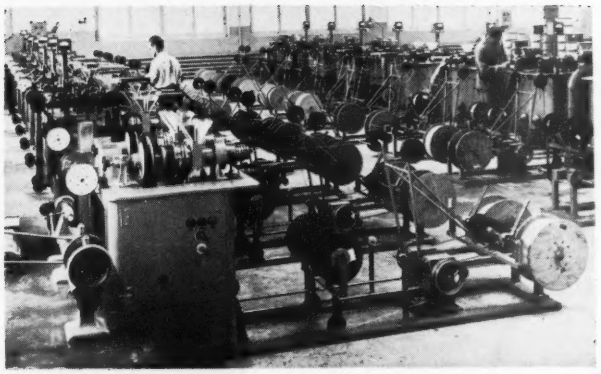


Fig. 6 Production of multicolored switchboard wire at Swiss Insulating Works.

passage. The machine is constructed in such a way that the stationary and the revolving parts are in contact only while the plastic material is still in granular form and cold. Therefore, joints do not present a problem, and the manufacture of multicolored insulating wires with striped patterns extending spirally throughout the entire PVC compound can be effected without difficulty.

★ ★ ★

While the production capacity of this machine may not be compared with that of a standard plastics extruder, it works so efficiently that one operator can service a great number of them.

The PVC Compound

The use of PVC insulated telephone wires has been viewed with a certain amount of apprehension. It was feared that the chemical composition of the compound could cause the following difficulties to occur:

(1) Discharge of hydrochloric acid during soldering of wire.
(2) Shrinkage of PVC caused by heat of soldering iron.
(3) Insufficient bonding of the color leads to each other.
(4) Migration of plasticizers or pigments or both.
(5) The difficulty of uniform dyeing.
(6) Lack of resistance to light on the part of the pigments.

★ ★ ★

These problems although they did exist, have been entirely solved by choice of the right PVC, plasticizers, pigments and stabilizers.

★ ★ ★

No formation of hydrochloric acid takes place within 180 seconds at 300-350°C. On a sensitive nephelometer such trouble is detectable only after 240-400 seconds. The insulating resistance does not diminish after 600 hours in a Weather-O-Meter at a temperature amounting to 60°C, which proves the absence of hydrochloric acid.

★ ★ ★

By using appropriate manufacturing methods it has been possible to reduce shrinkage of PVC by at least 0.5 mm.

★ ★ ★

No evidence of porosity between the color leads has ever been found. They bond perfectly, thanks to the configuration of the extruder head, the extrusion temperature and the high degree of compression.

★ ★ ★

Manufacturers of PVC are very familiar with the migration of plasticizers. In the case of multicolored wires, this could also cause the colors to run. To control the migration characteristics of plasticizers, the insulated wire is tested by being compressed at 80°C for 185 hours on a support covered with cellulose varnish. In this way, plasticizers can be selected that have no migratory tendency. At any rate, this is less likely to be the case in a hard compound (about 20% of plasticizer).

★ ★ ★

The choice of coloring agents has necessitated many tests each of which was designed to meet the following requirements:

(1) Complete insolubility in the plastic material.
(2) No change in color after 3 hours at 170°C.
(3) No change in color after 1500 hours in a Weather-O-Meter.

★ ★ ★

All pigments utilized at present meet these requirements. They are lightfast to a much higher degree than the varicolored textiles used previously.

Manufacture of Wires and Cables

With the machines described in the foregoing, any filiform product can be insulated. With suitable adaptations, it is even possible to extrude multicolored tubing; hence all types of wires with varicolored patterns can be manufactured. The respective telephone systems have issued, or are in the process of issuing, standards for the composition of varicolored wires and cables, and the requirements they have to meet. They vary from one country to another. For example, those imposed in Switzerland for switchboard wires are as follows:

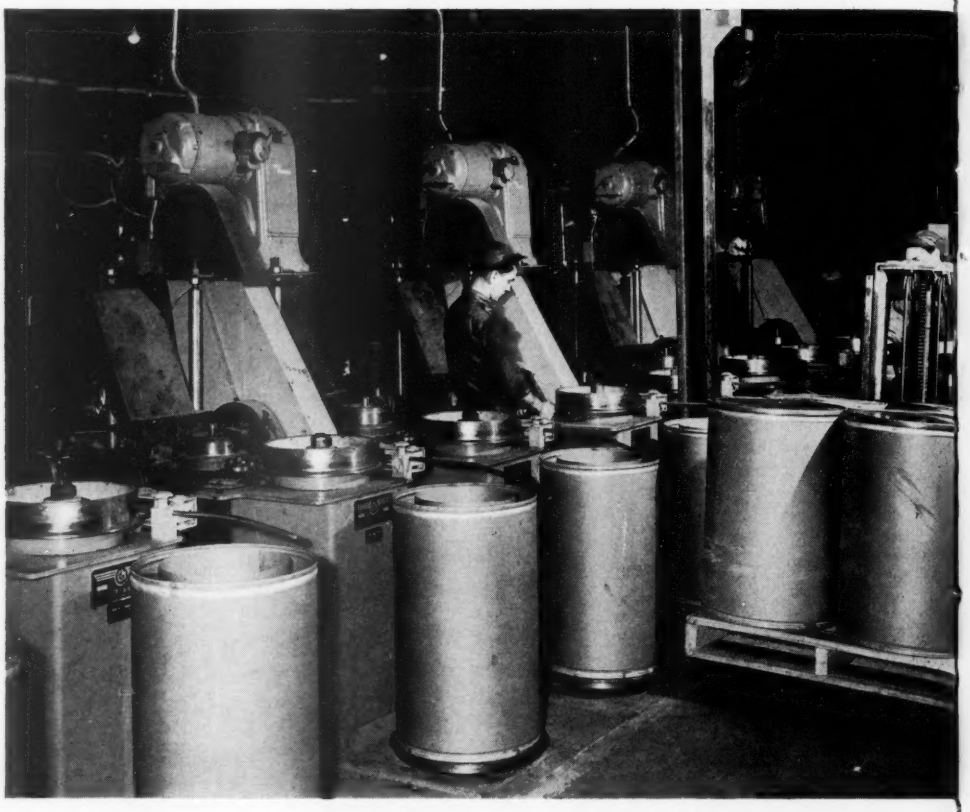
Resistance of conductor per 1000 m:
0.6 mm, 62 ohms max.
0.8 mm, 35 ohms max.
Insulation resistance per 1000 m, at 20°C:
a) Greater than 1000 megohms at 65% relative humidity.
b) Greater than 48 megohms after 48 hours at 100% relative humidity.
Capacitance per 1000 m at 100 cps:
0.08 MFD max.
Dielectric strength at 50 cps:
2000 V min., 2 minute value.

★ ★ ★

The wire must be capable of being bent without cracking. It must resist crushing, abrasion, scratching; it must be incombustible and have clear colors, well

(*Please turn to page* 594)

DRAW-PAK† PAYS MORE AND MORE!



MADISON WIRE COMPANY NOW OFFERS HIGH CARBON SPECIALTY WIRES DRAW-PACKAGED!

The installation of Coulter & McKenzie Draw-Pak equipment has enabled Madison Wire Company, Buffalo, N.Y., to supply both high carbon and low carbon specialty steel wires in 500 lb. Payoffpaks. Wires within the size range of .010″ to .062″ diameter in a variety of finishes — tinned, drawn galvanized, and liquor finish are now available Draw-Packaged. Some of the advantages are: Payoff speeds up to 3000 ft. per minute; neat, well protected packages containing up to 600 lbs. in a single length of wire; and maximum freedom from tangles and scrap loss.

A few of the applications on which the Draw-Packaged wire has shown definite advantages are: Speedometer Shaft Wire; Hose Reinforcement Wire; Vacuum and Defroster Hose Wire; Heddle Wire; Staple and Stapling Wire; Flexible Shaft Wire; Rope and Aircraft Cable Wire.

To see how DRAW-PAK can pay off for you, write for more information today.

†Trademark

Patent No. 2,732,060 — other U.S. and foreign patents pending.

771 WATER STREET
OPPOSITE RAILROAD STATION

TELEPHONE EDISON 5-1101
LIEBER'S CODE "MACKENZIE"

THE COULTER & McKENZIE MACHINE CO., INC.

SINCE 1843 BRIDGEPORT 3, CONNECTICUT, U.S.A. INCORPORATED 1881

Regarding Chains

by Dr. Ing. Hubert

In a recent issue of Draht-Welt there was published an article on chain manufacture in Germany that Jerome W. Howe has translated for the benefit of our readers. It is published here through the courtesy of Draht-Welt. Dr. Howe was formerly Dean of Admissions of the Worcester Institute of Technology.

The German commercial and quality-chain industry produces at the present time chains in the link dimensions from 3/32 in. to 4 in., which includes ship anchor chains. Up to the year 1857 only commercial chain, for example for agricultural work, was produced in Germany. Later, the manufacture of quality chain, such as marine and hoisting chains, was undertaken. The manufacture of quality chains was first accomplished by hand hammer work, and then later by planishing hammer, of which the recess was suited to the thickness of the iron. The drop-hammer, with its recess, by means of which the forging was simplified and perfected, was introduced in 1897.

★ ★ ★

Up to the year 1900 puddled iron was used. When electric welding came into use, especially for hoisting and commercial chains, wrought iron was substituted. For chains of greater thickness than about 1¼ inch, of course, at first puddled iron was used; today, however, wrought iron is in general use. The making of heavy chains with great link dimensions is as before by means of hand hammer work. Electro-welding is in use with thicknesses up to 1 inch.

★ ★ ★

Various equipment is needed for the fabrication of chains. The bending machines form the cut lengths of wire into chain links. Some machines bend single links and rings, while others also fit the links together to form the chain. Both types operate automatically. The weld is made on the long side of the link. The welding of the butt-joints is sometimes accomplished by hand-operated machines, sometimes by automatic. The former serve for the welding of single links, rings, etc., as well as for the attaching of implements. Agricultural chains were formerly frequently produced on hand-operated welding machines by single links, with the weld at the end of the link and the enlargement at the weld left unreduced. Today almost universally, smooth links are demanded for utility chains and automatically welded links with the weld on the side are employed.

★ ★ ★

The automatic machines serve for the continuous welding of hoisting and meter chains up to 1 in. thickness. The weld enlargements are smoothed after welding by swaging, and the burr sheared off. Machines equipped with drop-hammers are used for the welding of nose-rings, etc. Such are also used for the welding in of replacements for links found defective in testing.

★ ★ ★

Such implement chains as well as meter chains to be made into snow-chains as are required to be twisted are made in a twisting machine. The Kalibrier (design) machine is used for the uniform, accurate forming of the straight links, especially for hoisting chains. Testing of chains for carrying capacity is accomplished on a special machine using a specific loading. The so-called meter chains are mechanically stretched, whereby any defective links are eliminated. Other machines serve to fabricate implement parts, such as cross-bars, hooks, etc.

★ ★ ★

In order to ensure a good appearance of the finished product and eliminate inequalities as far as possible, the chains after welding are processed in the scouring tanks. This scouring continues, without any admixture, for 3 to 4 hours. Through scouring the material becomes brittle, hence for quality chains this process must be abbreviated and replaced with merely the removal of slivers and scale, foregoing a longer time for clean scouring and polishing. It has been determined that by even only superficial scouring the breaking load is reduced by about 7% and the elongation about 25%. The chains after leaving the scouring tanks are usually annealed above 900°C. Through the resulting so-called recrystallization, the existing grain enlargement is reduced and the material regains its normal properties.

★ ★ ★

The 2 to 3 hour polishing is accomplished by the admixture of acid-free leather scrap. This process also should be abbreviated as much as possible for quality chains. Beforehand, the chains are bundled. After polishing they are examined for defects.

★ ★ ★

By testing or by stretching, deformations of the links are made apparent, these signifying cold-stretch stresses. The slight blemishes can be remedied by cold-hammering; however even light hammering may cause cold-deformation resulting in brittleness.

★ ★ ★

For annealing of quality chains, hoisting chains, tool chains and chain parts, annealing pots as well as continuous ovens are employed. A standing continuous oven may be mentioned here, in which the chain passes from above in a vertical direction. The chain emerging at floor level can for strengthening be led immediately through a tank of water with regulated temperature. Similarly the speed of passage through the oven is adjustable to suit the thickness of the links. Chains to be finished as snow-chains receive in a special

(*Please turn to page* 597)

It Is Not Too Late to Make Plans to Attend

THE MIDWEST REGIONAL MEETING

OF THE WIRE ASSOCIATION

To be held May 24-25, 1956 at the Muehlebach Hotel, Kansas City, Mo.

Are you interested in "Pinpointing Your Accident Problems"? A. E. Asel, Safety Director, Sheffield Steel Division of the Armco Steel Corporation, will tell you how.

Would you like to learn something of "The Metallurgical Qualification of High Carbon Steels"? Hugh A. Springer, Metallurgist at Armco's Sheffield Steel Division, has some good information on the subject for your edification.

Does "The Metallurgical Aspect of Scale Control on Hot Rolled Rods" conjure up memories of your own scale problems? Earl L. Knapp, Metallurgist, also of Armco's Sheffield Steel Division, is prepared to offer some helpful advice based on experience.

Are you concerned about rising material handling costs? In his paper on the "Automatic Conveying of Coiled Wire" C. J. Willis, Assistant Wire Mill Superintendent at Union Wire Rope Corporation, hopes to offer some pertinent and timely answers.

On Thursday, May 24th, registration will start at 10 a.m. and the technical session with the above 4 papers opens at 1 p.m. A cocktail party through the courtesy of Armco and Union Wire Rope is scheduled for 6:30 p.m., to be followed by the banquet at 8 p.m. These are the events for the first day.

Friday, May 25th, will be devoted to plant inspection tours of Sheffield Steel's mill in the morning and Union Wire Rope's mill in the afternoon. For those desiring to visit an electric wire plant, the Whitaker Cable Corporation will conduct men through their plant. Busses for all trips will be provided by the Program Committee.

One fee will cover registration, busses and the banquet. This will be $13.00 for members and $15.00 for non-members. Your hotel accommodations will be extra.

Does this program sound good? Then make your hotel reservations NOW and write Stewart S. Gray, Program Chairman, care Union Wire Rope Corp., that you'll come.

THE WIRE ASSOCIATION

RICHARD E. BROWN, Executive Secretary

453 Main Street • Stamford, Conn.

The Predetermination of Tensile Strengths in Steel Wire Manufacture

by C. Coates, Esq.

Frederick Smith & Co. Wire Manufacturers, Ltd.

Halifax, England

This paper, presented on February 1, 1956, in the Staff School of the Company's Caledonia Works at Halifax, was awarded a certificate of excellence by the School's Adjudicators. The paper gives a clearer understanding of the basic principles of the manufacture of patented steel wire. It is published through the courtesy of the author's company.

Whilst wire has been made and drawn for thousands of years, the beginnings of the industry as we know it today were in the early 1800's. The inventions and developments in the steel making industry —those of Bessemer, Thomas and Gilchrist in this country—the work of Siemens and of the Frenchman, Martin, were making the conditions and providing the raw material for the building up of the present-day wiredrawing industry.

★ ★ ★

There are actual written records dating back to 700 A. D. and 800 A. D. which give details of how wire was then drawn through a hole in a metal plate; but it is during the last 100 years that the steel and mild steel wiredrawing industry has undergone expansion and technical development on a vast scale.

★ ★ ★

The discovery by **James Horsfall** of the heat treatment process for which he was granted letters patent in 1854, and which is known in the industry today as the "patenting" process, was perhaps the first milestone within the wiredrawing trade itself, whilst the discovery of the methods and materials involved in manufacturing the tungsten carbide die and the die's application to the industry in the 1920's, was perhaps the most momentous in the results it achieved. The combined result of all these discoveries and new methods has been a constantly increasing output and the uses of the resultant huge quantity of finished drawn wire are today many and varied.

★ ★ ★

In order to determine the suitability of a wire for its proposed use certain requirements must be satisfied and these can be divided into three groups:

a. **Surface condition or finish.**
b. **Chemical composition.**
c. **Physical properties.**

★ ★ ★

It is the last group—physical properties—with which this paper is concerned, although it is appreciated that the groups are interrelated; particularly groups (b) and (c) because differences in chemical composition of any two steels will produce different physical properties, as in the case of free cutting steels where the known effects of sulphur and phosphorus are used to advantage.

★ ★ ★

In the production of wire, the hot rolled rod—after suitable preparation which may include the heat treatment process of patenting prior to the surface preparation processes of acid cleaning, coating, lime or borax dip and finally drying—is drawn through a tapered hole in a tungsten carbide or steel die, the diameter of the hole being smaller than the ingoing rod by a prescribed amount. In this drawing process two forces react on the ingoing rod; there is a pulling force or tension which is applied by the drawing capstan, and a compressive force on the surface of the rod as it comes into contact with the bearing surface of the rigidly held die. The result of these two forces is an elongating action and the wire issuing from the die exit is smaller in cross sectional area but of greater length than the ingoing rod.

With repeated passes through successively smaller dies the size becomes smaller and smaller and there is a marked alteration in the physical properties of the metal.

★ ★ ★

The changes in the physical properties as the wire is reduced in size can be listed as follows:

a. **Tensile strength increases.**
b. **Torsion values increase.**
c. **Elongation values decrease.**
d. **Reduction of area at fracture decreases.**

★ ★ ★

There are in addition to these alterations, changes in:

e. **Density.**
f. **Electrical conductivity.**
g. **Magnetic permeability.**
h. **Speed of solubility.**

★ ★ ★

But these latter changes can, in the majority of cases, be regarded as of secondary importance. When plotted, the alterations to tensile strength, percentage elongation and reduction of area at fracture give results similar to those shown in Fig. 1.

★ ★ ★

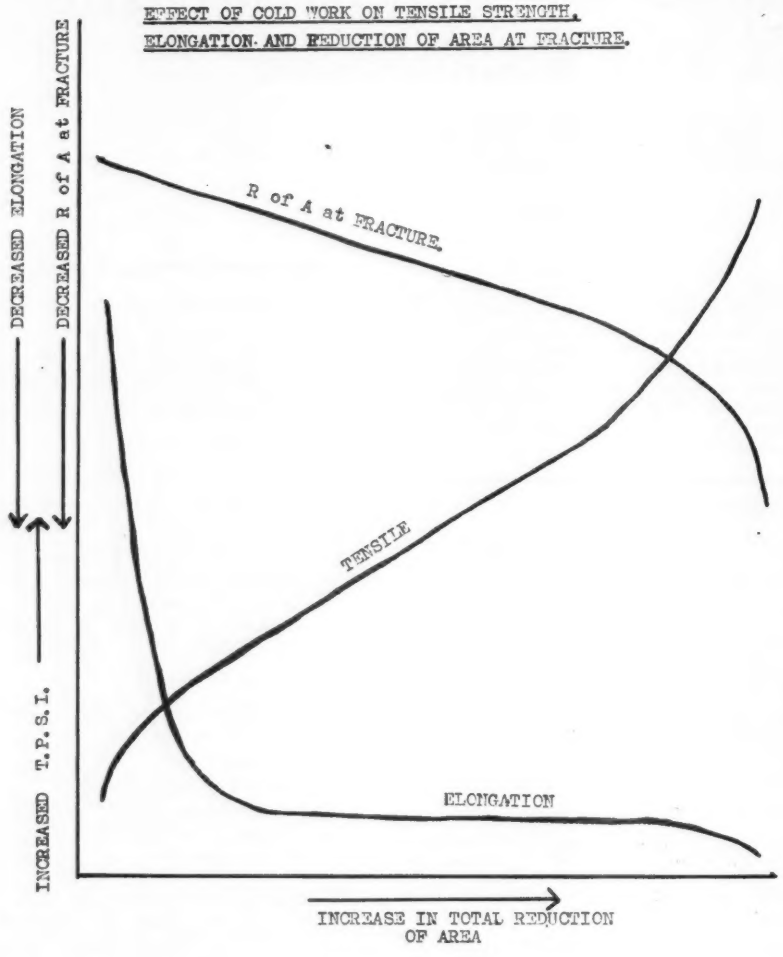
The values for elongation suffer most severely as soon as the work commences, and drop to a very low level, then maintain this level until the overdrawn stage is reached. This state of affairs exists with all qualities of materials and is an indication of why a high elongation value in an unprocessed material is no guarantee that the material is capable of withstanding a large amount of cold working.

★ ★ ★

The values for reduction of area at fracture are not affected quite as drastically as those of elongation although there is a marked falling off as the overdrawn stage is reached.

Fig. 1.

EFFECT OF COLD WORK ON TENSILE STRENGTH, ELONGATION AND REDUCTION OF AREA AT FRACTURE.



The other effect of cold working by drawing which is most noticeable is that of hardening, and here care must be taken in the terms used since, whilst "hardness" is the opposite to "softness" it does not necessarily imply brittleness.

★ ★ ★

Hardness tests, such as the Brinell Test and others, show a steady increase in values as the amount of cold work is increased. The Brinell Test can in fact be used as a check of the tensile strength of drawn material and tables are available for evaluating the tensile strength when the Brinell number is known and vice versa. When irregular shapes are required as in section drawing, difficulties occur in arriving at the true cross sectional area when using ordinary micrometers for the various measurements and the Brinell Test is a useful alternative method of determining the tensile strength without having to resort to very accurate weighing of an exact length in order to determine the area of cross section.

★ ★ ★

From Fig. 1 it will be apparent that the tensile strength rises at a fairly quick rate during the early stages of cold working, then slows up a little over the broad middle range of cold working, and finally rises at a quick rate again as it approaches the maximum reduction of area. To take an actual example, a 5g rod, having a carbon content of 0.69% gave the results shown in Fig. 2.

★ ★ ★

Here it will be seen that the amount of cold work which has been performed has been expressed as a reduction of area percentage. Since variations in the amount of cold working can be expressed in numerous ways it is important that the basis be indicated and in this instance, and in all further references to reduction of area in this paper, the value is arrived at from the equation:

$$100 \times \frac{A-a}{A} = \text{Percentage reduction of area}$$

where A = Cross sectional area before drawing
and a = Cross sectional area after drawing.

★ ★ ★

In actual practice, however, it is not necessary to calculate percentage reductions of area in this way; the use of a standard slide rule enables one to determine reduction percentages very rapidly, using for the calculation the diameter of the inlet material and that of the drawn wire—two factors which are already known. The inlet diameter on "c" scale of the slide rule is set against the finished diameter on "d" scale—the answer in terms of percentage reduction of area is then obtained by deducting from 100 the reading on "a" scale which is in line with 1 (or 100) on "b" scale.

★ ★ ★

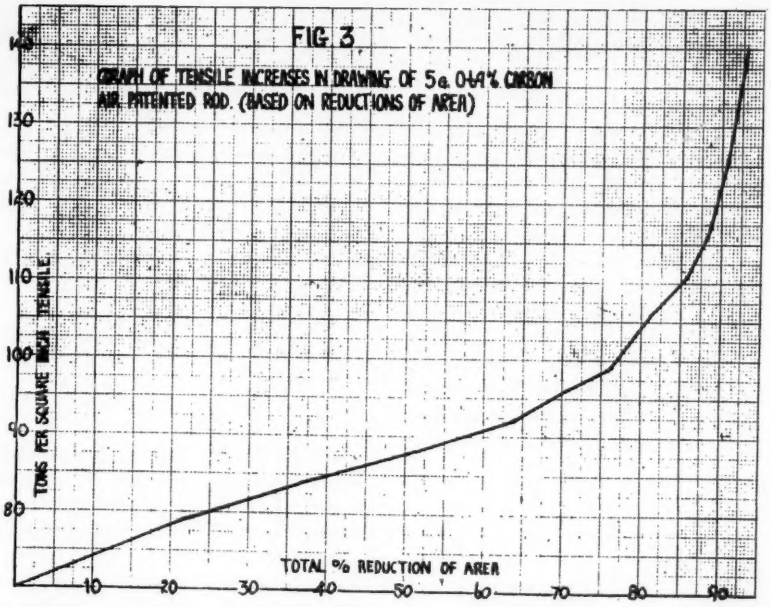
In order to serve as a basis for reference during production planning the results shown in Fig. 2 can be plotted as a graph and the result of this is shown in Fig. 3.

Figure 2.

Tensile Increases in Drawing of 5G. 0.69% Carbon Air Patented Rod

	T.P.S.I.	R of A %
As Patented	70	-
After 1st pass	79	21.5%
" 2nd "	84	37.2%
" 3rd "	88	51.3%
" 4th "	92	63.5%
" 5th "	96	70.1%
" 6th "	99	76.0%
" 7th "	106	81.2%
" 8th "	111	85.8%
" 9th "	117	88.5%
" 10th "	126	90.8%
" 11th "	140	93.04%

Knowing what is the rate of increase of tensile strength for any particular material is, of course,



part of the fundamental knowledge required in wiredrawing practice, in order that the correct material may be chosen to give the desired tensile strength in the finished wire.

★ ★ ★

This information can be set out in a variety of ways; the graphic method possibly giving quicker appreciation of the information than if set out in the form of tables. A difficulty arises when plotted as in Fig. 3, however, because a very large proportion of steel wire production lies in the range 65% to 95% reduction of area, where the line on the graph is taking an upward sweep and where small increments of reduction of area result in big increases in tensile strength.

★ ★ ★

If the increase in tons per square inch, between 70% and 80% reduction of area, be divided out it will be seen that this equals 0.85 TPSI increase for each 1% reduction of area when expressed as an average value; but between 80% and 90% reduction of area it is 1.8 TPSI for each 1% reduction of area, whilst between 90% and 93% reduction of area it is 5.91 TPSI for each 1% reduction of area.

★ ★ ★

Alteration in the spacing of the ordinates of the graph will not, of course, obviate this difficulty. Several alternatives are available however, and if the volume of the metal in its various stages be considered the following equations are pertinent:

Cross sectional Area x Length = Volume
Volume of ingoing rod = Volume of drawn wire
or $\frac{1}{2}D_1^2 \times \pi \times L_1 = \frac{1}{2}D_2^2 \times \pi \times L_2$
or $\frac{D_1^2}{D_2^2} = \frac{L_2}{L_1}$
where D_1 = **Diameter of rod**
D_2 = **Diameter of drawn wire**
L_1 = **Length of rod**
L_2 = **Length of drawn wire**

★ ★ ★

From these equations it will be seen that the amount of cold work applied to a wire can be expressed as the ratio of the total length of drawn wire against the total length of ingoing rod. This ratio can be obtained by dividing D_1^2 by D_2^2, but again the standard slide rule affords the quickest and easiest means of making the calculations; D_1 on "c" scale is set against D_2 on "d" scale and the answer is read off "b" scale opposite 1 (or 100) on "a" scale.

★ ★ ★

If these values are worked out for the reductions listed in Fig. 2 the result is as shown in Fig. 4, and on this basis the graph shown in Fig. 3 becomes as shown in Fig. 5. The section of the graph which is of most importance is now from the point where $\frac{D_1^2}{D_2^2} = 4$

Figure 4.

Reduction of Area Expressed as Length Ratio

	Total R of A %	Length Ratio $\frac{D_1^2}{D_2^2}$
As 1st pass	21.5%	1.28
2nd "	37.2%	1.6
3rd "	51.3%	2.07
4th "	63.5%	2.75
5th "	70.1%	3.35
6th "	76.0%	4.17
7th "	81.2%	5.33
8th "	85.8%	7.03
9th "	88.5%	8.68
10th "	90.8%	10.95
11th "	93.04%	14.3

and greater, and it will be seen that the plotted figures result in what can be considered, for practical purposes, a straight line for this section.

★ ★ ★

Determination of the correct base inlet size to yield the required tensile strength at any desired finishing size becomes, therefore, a great deal simpler and more accurate. If necessary, the ratios $\frac{D_1^2}{D_2^2}$ can be worked out for given reduction of area percent figures and put into table form for easy reference or, assuming that sufficient information is available to build up a series of graphs for differing qualities of material, a set of standards can be compiled which will enable those engaged in production planning to work much more closely to desired tensile strengths.

★ ★ ★

There is, however, another major essential in the production of finished wire to a particular tensile strength; whilst what has already been discussed can with advantage be used as the basis for ultimate tensile pre-determination it is equally important that the variation within a particular batch

of material be kept as small as possible.

★ ★ ★

No cast of steel wire rods ever give exactly the same tensile, coil for coil, when tested 100%; and this is equally true of any batch of finished drawn wire. It is essential that this variation should be kept to an absolute minimum if the material is to be regarded as first quality and, from the consumer's point of view, whatever the end use of the wire is to be—for ropes, springs, or for any of the other countless uses to which wire is put today—it will obviously be of benefit that a high degree of uniformity be achieved.

★ ★ ★

In reviewing the possible causes in batch variation it is necessary to consider any variations which may arise in the unprocessed rod. Whilst it is normal and indeed desirable that the steel used for the production of a batch of material to a particular size and tensile be all from the same cast, there always arises the instance at the end of a cast of rods where part of a second cast has to be introduced to make up the desired quantity. Experience has shown that carbon content as quoted in the steel maker's analysis is not always sufficiently accurate for determining whether two batches of steel may be put together to make up a particular weight. One cast of steel which is regarded as having a carbon content of 0.65% can yield quite different results in ultimate tensile strength to those obtained from another cast of 0.65% carbon material.

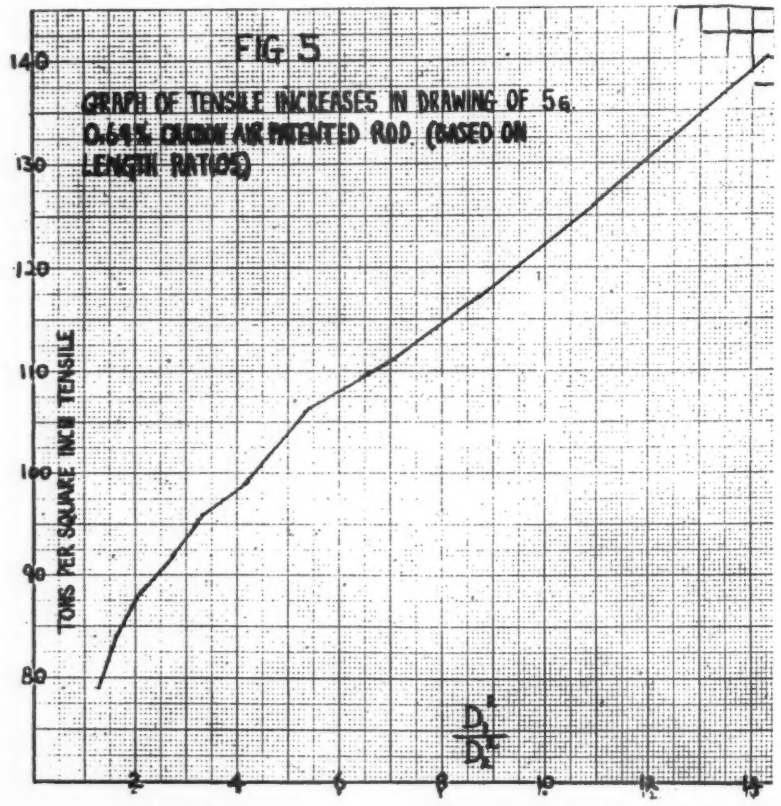


Figure 6.

Effect of Cooling Rate on Tensile Strengths of Patented Materials

Carbon Content	Size	Average Value for Tensile Strength after Air Patenting
0.40%	12 G 17 G	47 T.P.S.I. 50 T.P.S.I.
0.50%	7 G 10 G 14 G	48 T.P.S.I. 50 T.P.S.I. 52 T.P.S.I.
0.80%	8 G 12 G	75 T.P.S.I. 80 T.P.S.I.

★ ★ ★

An appreciably wide variation in the results of the chemical analysis for carbon content can be found when checked independently as the following figures, taken at random from eight different casts of steel, show:

Carbon content as quoted by supplier	Carbon content given by independent check
0.66%	0.68%
0.73%	0.74%
0.49%	0.49%
0.70%	0.67%
0.62%	0.65%
0.48%	0.52%
0.77%	0.80%
0.50%	0.53%

★ ★ ★

In addition to the carbon content of steel being a determining factor in the final tensile strength of the drawn wire, the other constituents in the steel—those of manganese, silicon, sulphur, phosphorus, nickel and chromium—all play their part in the increase in tensile strength due to cold working, so that the degree to which they are present must also be taken into account.

★ ★ ★

Irregularities which may occur during the heat treatment process are another cause of variation in tensile results. In patenting, the material is heated to above the critical point for the steel, generally to within the range 875°-975°C, according to quality and practice, and held at temperature for a known length of time to ensure adequate soaking. In the patenting of drawn wire this soaking period is of particular importance if the effects of the previous cold working are to be completely eliminated. Should the temperature control of the patenting furnace be insufficiently precise there will obviously be variations in the structure of the material processed.

★ ★ ★

Variations in furnace temperature, which lead to higher wire temperatures, will result in a coarser grain structure in the material — whilst wire exposed to lower temperatures will have a finer grain than that accepted as standard. Since patenting is essentially a process where the wire is uncoiled, passed through the furnace as a single strand and finally recoiled, it follows that even on a modern high speed plant an

appreciable time will elapse between the start of a coil and its finish; it therefore follows that if accurate furnace temperature control is not maintained there is always the likelihood of getting considerable grain size variation within each individual coil, with a consequent variation in results from the subsequent cold working.

★ ★ ★

Variation in speed of travel of the wire through the patenting furnace due to electrical supply fluctuations or to mechanical failures will have a somewhat similar effect to temperature variations. Material which is processed at too fast a speed, even if it should possibly reach the desired temperature, will not have the requisite soaking time at that temperature; whilst material processed at too slow a speed will be subjected to overlong soaking and consequently will have a coarser grain size than standard.

★ ★ ★

In addition to the variables which can occur in the patenting process due to temperature and speed differences, there is a further aspect which needs to be examined relating to the size of the material being processed. When the material is allowed to cool in air, as in the case of air patenting, thicker wires, because of the amount of heat retained as they pass out of the furnace into air, cool appreciably slower than do finer wires. Because of the quicker rate of cooling of the finer wires as they leave the furnace, the tensile strength for any given quality of patented steel is higher in the finer sizes than it is in thick sizes.

★ ★ ★

Whilst this difference is not excessive in every instance, it is sufficient to need consideration in high quality wire production, particularly so in the higher carbon ranges where the effect of the cooling rate on the tensile strength is most pronounced. Fig. 6 illustrates this effect. Together with this variation in tensile strength between different sizes of the same material, there is, of necessity, a difference in the microstructure of the two—the finer sizes having a finer grain structure.

The third factor which requires to be considered as a possible cause of tensile variation is the wire-drawing itself. Considerable research work has been done by various people in investigating the effect of drawing speeds on the tensile strength of the drawn wire and it has been found that, in general, there is no appreciable alteration to the tensile properties due to different speeds. The only exception to this is when exceedingly slow speeds are in operation, but as these are far slower than commercial practice this variation can perhaps be safely ignored.

The results of differing reductions of area at each pass have not, it is believed, been investigated to anything like the same extent and it would seem that there is scope for future work in this direction.

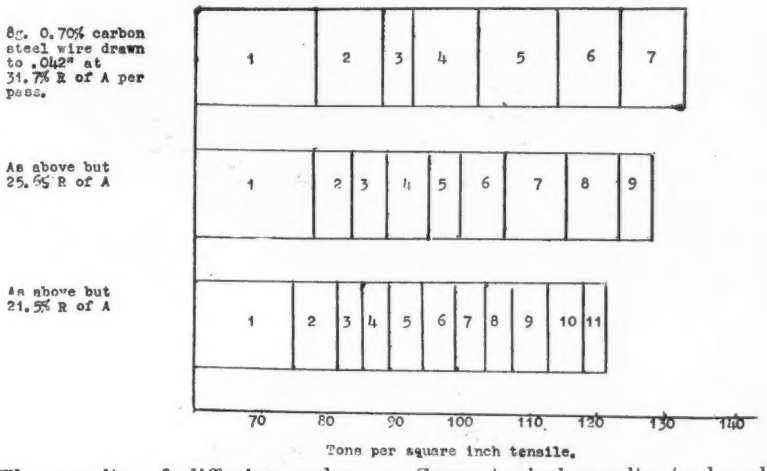
★ ★ ★

For the production of the majority of dry drawn steel wires of down to 22 S.W.G. the reduction of area per pass is usually somewhere between 20% and 30%; whilst one particular percentage reduction within this range may have been found to give the best results it is, unfortunately, impracticable to adhere to a very close limit in this respect because of the increased machine stoppage time which would arise from the greater incidence of die changes necessary to maintain precise draftings for every job, and huge die stocks such circumstances would demand.

The usual practice is, therefore, a compromise involving some variation in the reduction of area per pass together with die stocks which are commercially practical. Variations in the reduction of area per pass can, however, result in quite appreciable alteration in the values for tensile strength of a particular material and, indeed, the practice of raising the tensile strength of finished wire by decreasing the number of passes in order to increase the reduction per pass is of long standing and widely used throughout the industry.

Figure 7.

Effect of Draftings on Tensile Strengths of Finished Material.



Some typical results to be obtained by this practice are illustrated in Fig. 7, which shows the effect of drawing 8g wire of 0.7% carbon content to 042 in 11, 9 and 7 passes using a reduction of area per pass of 21.5%, 25.6% and 31.7%.

★ ★ ★

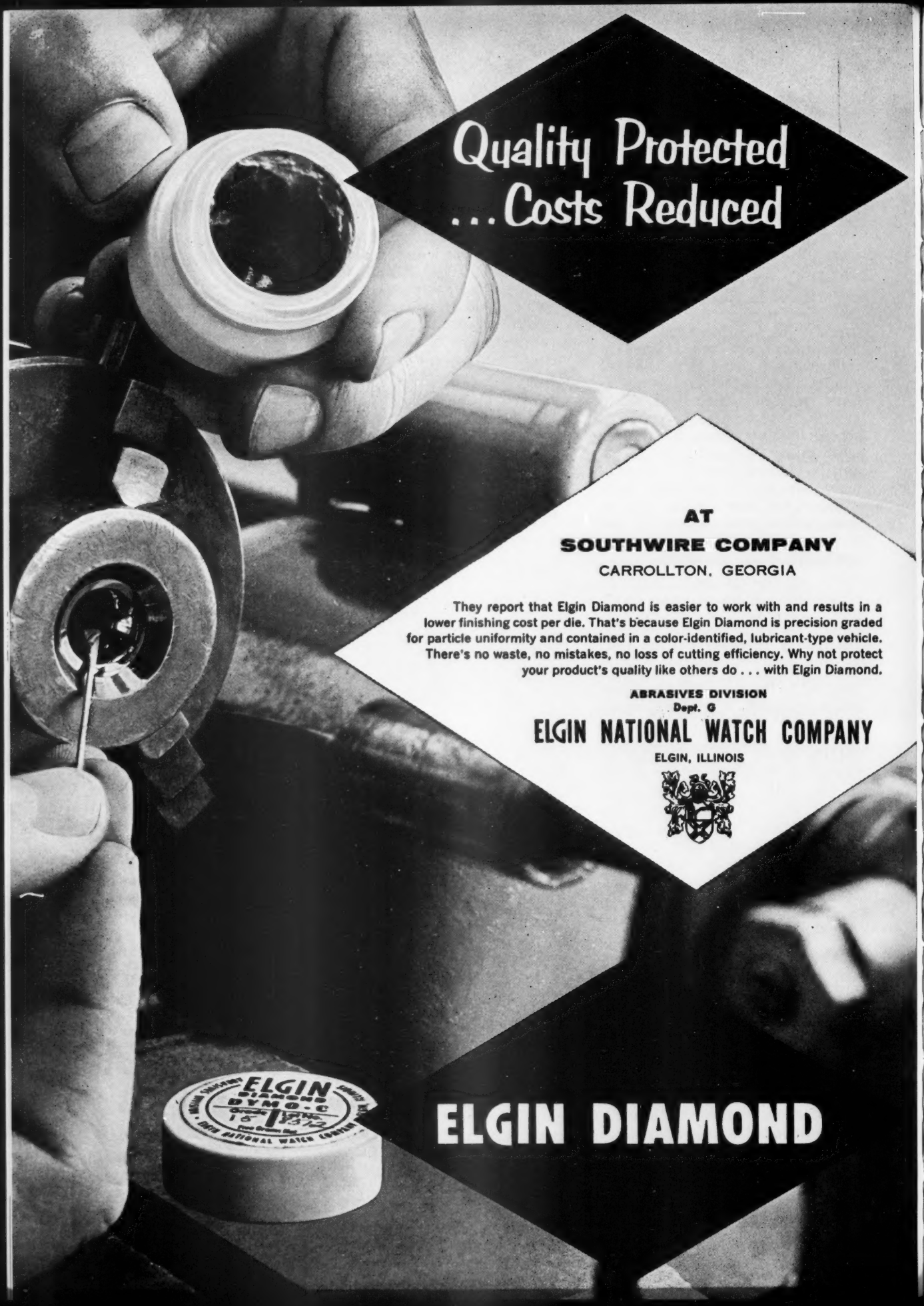
To sum up the causes of tensile variation they can be listed as follows:

a. **Inaccuracies in original classification of raw material.**
b. **Unsatisfactory temperature control of heat treatment plant.**
c. **Variations in process speeds.**
d. **Too wide a range of reduction of area per pass during cold working.**

★ ★ ★

Extremely satisfactory results should be obtained by close atten-

(*Please turn to page* 596)


Quality Protected
...Costs Reduced
AT
SOUTHWIRE COMPANY
CARROLLTON, GEORGIA
They report that Elgin Diamond is easier to work with and results in a lower finishing cost per die. That's because Elgin Diamond is precision graded for particle uniformity and contained in a color-identified, lubricant-type vehicle. There's no waste, no mistakes, no loss of cutting efficiency. Why not protect your product's quality like others do . . . with Elgin Diamond.
ABRASIVES DIVISION
Dept. G
ELGIN NATIONAL WATCH COMPANY
ELGIN, ILLINOIS
ELGIN
DIAMOND
DYMO-C
ELGIN DIAMOND

Protection Problems on Telephone Distribution Systems

by J. W. Phelps

Outside Plant Development Department, Bell Telephone Laboratories, Inc.

Murray Hill, New Jersey

Mr. Phelps delivered this paper at the Signal Corps' Fourth Annual Wire and Cable Symposium at Asbury Park, N. J., on December 7, 1955. In it he calls attention to the rapidly expanding use of plastics for wire insulation, outlining some of the problems arising from changes made in wire and cable jacketing practices.

Recent years have seen some interesting innovations in telephone distribution systems. Principal among these innovations from the standpoint of the person entrusted with the protection of telephone wires and cables is the rapidly expanding use of plastics as conductor insulating materials and as cable sheathing materials. Polyethylene (and to a lesser degree, polyvinylchloride), has given to the designer and manufacturer of wire and cable products a high dielectric strength material with the further attributes of toughness and long life, which is at the same time relatively impervious to water and a large number of corrosive substances. To the electrical protection engineer these various attributes have been by and large helpful, due mainly to the high dielectric strength of polyethylene as compared to commonly used paper dielectric material.

★ ★ ★

When new materials or techniques are inserted into an older, well understood system, it is almost a truism that some unforeseen problems will arise. Such is the case in the protection of telephone cables and wires with plastic insulating and sheathing materials. In order to examine these new problems it might be advisable first to review some of the protection schemes that apply to paper insulated facilities so that a comparison can be made. We should bear in mind all the while that the wire network in an exchange area consists of cables of various sizes and lengths and of unshielded wires, all varying widely in degree of exposure to foreign voltages. Consequently, no two exchange systems are protected in precisely the same fashion. Instead, many sections, due to their physical layout and exposure to foreign voltages, are protected in a tailor-made manner.

Protection of Paper Insulated Lead Sheathed Cables

There are three ways in which lightning currents may be impressed on telephone cable conductors. They are:

a. **By direct strokes to the telephone system.**
b. **By inductive coupling between the telephone conductor and the lightning channel.**
c. **By conduction from open wire extensions or drop wire loops which have had impressed upon them lightning currents from direct strokes or by other means.**

★ ★ ★

Direct strokes do occur on telephone plant, but their rate of occurrence is so low that the protection apparatus necessary to guard against their destructive effects is normally not used. There is a much larger number of induced lightning surge currents impressed on the telephone plant, but in general they are of smaller magnitude than those which reach the cable conductively. If, therefore, protection apparatus is designed and installed to handle safely the conductive surge currents, in item C, induced currents will in general do no damage to the cable system.

★ ★ ★

Since a drop wire run is generally much shorter and less severely exposed to lightning than an open-wire extension, it collects and transmits to the cable fewer surges than does an open-wire extension. Surges at cable—open-wire junctions may have crest currents in excess of 6000 amperes, as shown on Figure 1. This figure, based on data gathered in 211 measurements, tells only the distribution of the surge current magnitudes. The frequency of occurrence of these surges is a function of the number of thunderstorms annually in any particular part of the country (See Figure 2), and to a lesser degree, topographical characteristics, soil resistivity and the presence or absence of objects which might shield the telephone network.

★ ★ ★

It is apparent therefore that during each period of thunderstorm activity, a number of surge currents are transmitted over open-wire conductors to the cable to which they are connected. There is frequently sufficient potential present to cause arcing between the open-wire conductors so that the whole open-wire lead is effectively energized. The currents so transmitted enter the cable at the junction and raise the potential of the connected cable conductors. Voltages are also induced in the cable sheath and in the other cable conductors if such are present, and these potentials exist in decreasing magnitude for some distance back along the cable. Figure 3 shows an example of the potentials existing along a cable for a particular size and length of cable and for a unit of input surge current.

★ ★ ★

To cause a permanent trouble in cable conductors, two things are required. First there must be suf-

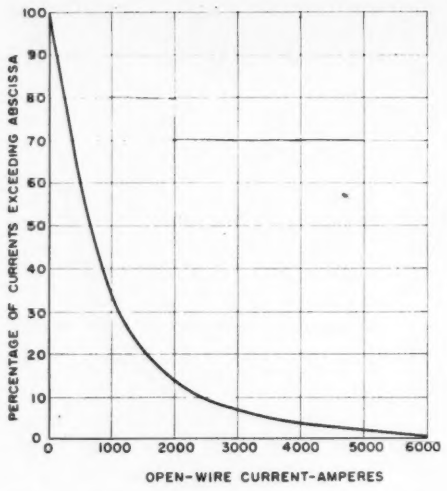


Fig. 1—Crest Current Distribution For Lightning Currents At Exchange Cable Open-Wire Junctions.

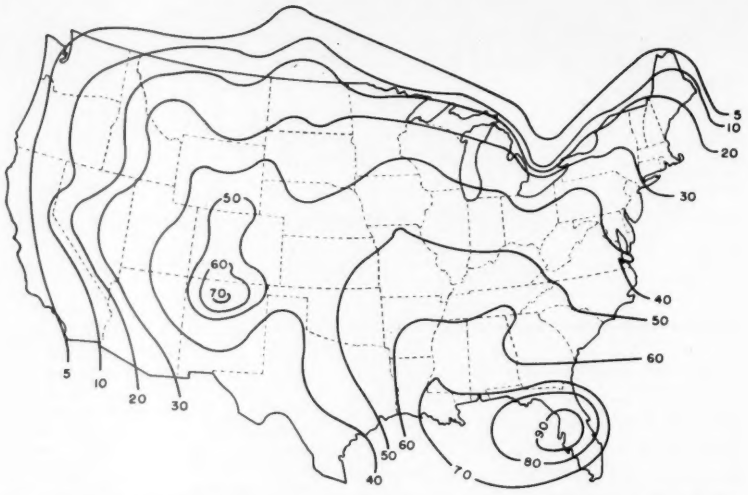


Fig. 2—Average Annual Thunderstorm—Day Activity—U. S. Weather Bureau—1904 To 1933.

ficient difference of potential between wires or wire and sheath to cause dielectric failure of the insulation. Secondly, there must be sufficient current in the arc to "burn the trouble in." For the more common wave shapes encountered in actual practice, currents with crests greater than about 1000 amperes are sufficient to cause permanent trouble. From Figure 1, it can be seen that such surge currents constitute some 35% of all surges at open-wire junctions with cable. It is therefore necessary to hold the potential differences between pairs and between pairs and sheath to below the breakdown value of the insulation, if troubles are to be avoided.

★ ★ ★

The potential difference between

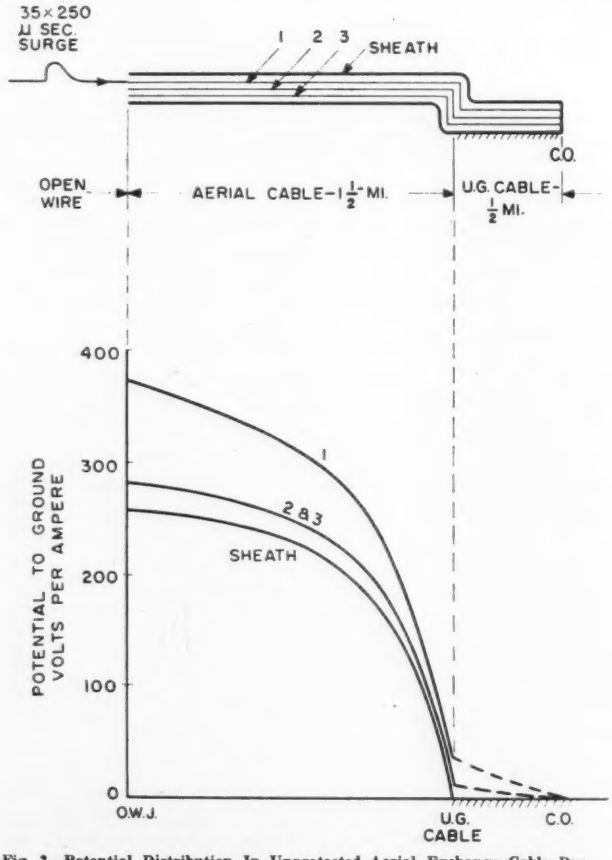


Fig. 3—Potential Distribution In Unprotected Aerial Exchange Cable Due To Surges Entering Conductor.

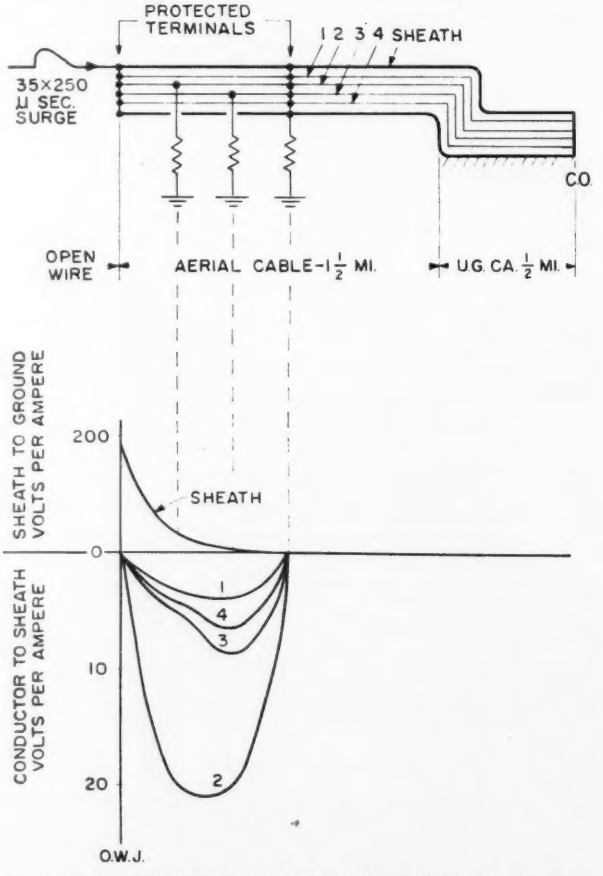


Fig. 4—Potential Distribution In Aerial Exchange Cable Due To Surges From Open-Wire Line.

the cable sheath and the cable conductors that connect to the open wire can be reduced to a safe level through the use of carbon block protector gaps which are placed between the conductors and the sheath. This, however, may not sufficiently reduce the potential differences between the energized conductors and any other conductors in the cable. If the cable is small, which is the most likely condition if the open wire is an extension of the cable, it is then practicable to place protector blocks between all of the cable conductors and the cable sheath. This will allow the potential at the junction to rise with respect to remote ground, but it will minimize the potential differences between the various parts of the cable caused by surge currents arriving over the open-wire conductors. The magnitude of the potential rise at the junction with respect to remote ground may be reduced by bonding the cable sheath at the junction to a low impedance ground.

★ ★ ★

If the open wire is so very severely exposed that many of the lightning surges result in permanently grounded protector blocks at the junction, additional protection (often called auxiliary or buffer protection) may be added out on the open-wire lead to divert a part of the surge current before it reaches the cable. This obviously requires a low impedance ground at the auxiliary protection point and becomes impractical in areas of rocky, high resistivity soil or where a power system multi-grounded neutral conductor of low impedance is not close at hand.

★ ★ ★

In actual practice, the voltage equalization achieved through the use of "full cable-count protection" (as the scheme of protector blocks on all cable pairs is called) is not maintained throughout the length of the cable due to the fact that there almost always are grounds on the conductors at various points along the cable. Figure 4 is a simplified example of the above, in which two cable pairs are attached to 20 ohm grounds at intervals along the cable between two protected points. Such would be the case if the cable pairs were connected to drop wire runs, which are effectively grounded at the station protector under surge conditions. Furthermore, one or more pairs of open wire might tap onto the cable at an intermediate point. In order to obtain adequate protection along the cable it may be necessary to place protection at these intermediate drop wire or open wire taps, either on the pairs involved or sometimes on all pairs. Unfortunately, the use of protection on all pairs is practical only for smaller sized cables. For larger cables, it is often necessary to use surge diverting techniques on the open-wire extensions, or to lay out the cable pair count so that the cable pairs are protected in groups at points adjacent to the point of exposure.

★ ★ ★

When cables are supported on poles which also carry power conductors, it is often desirable to bond the cable sheath to the power system neutral wire, thereby assuring a low impedance path to ground for the power system in the event of contact between a power phase wire and the cable. The low impedance limits the cable potential rise at the point of contact and promotes prompt de-energization of the power supply, which in turn limits the damage to the cable. Bonding of the cable sheath to the neutral wire also provides supplementary paths over which lightning surge currents may be dissipated. However, such bonding, to be effective, must be coordinated properly with the overall protection scheme.

Protection of Polyethylene-Sheathed Paper-Insulated Cables

Polyethylene has been used in the sheaths of three types of distribution cable in the Bell System to date. These types are Alpeth, Stalpeth and Polyethylene Jacketed cables. The Alpeth and Stalpeth cables have outer jackets of polyethylene over corrugated layers of aluminum and steel plus aluminum respectively. The Polyethylene Jacketed cable has an outer jacket of polyethylene over a lead sheathed cable with a reduced thickness of lead. The latter type is used principally in conduit systems where corrosion mitigation is necessary. All three types are available with conventional paper insulated cores.

★ ★ ★

The inner metallic jacket in each type, necessitated by both noise and protection requirements, is of higher resistance per unit length than the same size lead sheath cable, except for Alpeth cables less than 0.7 inch in diameter which have lower resistance sheaths than lead. However, the magnitude of the difference is quite small for small cables and becomes of appreciable size only for very large cables. Since these larger sizes are almost always used in more compactly built up areas where the exposure to lightning surge currents is lower, the increased sheath resistance is of small consequence. Conversely, the smaller sized cables are more often found in suburban and rural areas, where the lightning exposure is more severe, and where their lower sheath resistance affords greater protection. For the foregoing reasons, the protection practices outlined for paper-insulated lead-sheathed cables may be applied with comparable results directly to cables with polyethylene sheaths.

★ ★ ★

Although the dielectric strength of polyethylene sheath is sufficient to withstand breakdown between the power conductor and the inner metallic jacket in the event of contact with the great majority of power systems, it is not possible to place too great reliance on this feature. Many power contacts are not solid ones and the power conductor may slide along the cable. Consequently, the lashing wire and the supporting strand are almost certain to be energized. There will then be localized heating near the point of contact, which may cause softening of the polyethylene. As a result, the inner metallic sheath or the sheath and conductors both may finally be energized. To limit damage in cases such as this, the strand should be well grounded, preferably to the multi-grounded neutral. Also, there should be frequent bonding between the sup-

porting strand and the inner metallic sheath. This lowers the fault path impedance and hastens deenergization of the power system. Bonds are supplied at splices, at terminals and at loading coil points, and normally these are sufficient, but there may be special cases, such as rural cables with infrequent terminals, where additional bonds would decrease the probability of damage.

★ ★ ★

As the polyethylene between strand and inner metallic sheath has a finite dielectric strength, it is possible for lightning surge currents on the strand to build up sufficient potential difference between strand and sheath to cause breakdown of the dielectric. In general, the greater the distance between strand-to-sheath bonds, the greater the probability of sheath puncture. This is due to the fact that in the longer bond-to-bond sections, a greater percentage of the normal distribution of surge currents collected will produce sufficient IZ potential to cause puncturing.

★ ★ ★

Some tests currently in progress indicate that small aerial cables in high lightning incidence areas should have bonds no greater than 1,000 feet apart in order to keep the number of sheath punctures to an acceptable value. It is not feasible to add enough bonds to keep the cable from ever being punctured, as direct strokes to the strand will occur and these may be of sufficient magnitude to cause punctures within a short distance of a bond. Further tests are expected to yield more precise information on the optimum spacing of bonds to minimize the combined cost of bonding and puncture repairing for the several sizes of cable.

Protection of Polyethylene Insulated Cables

The dielectric strength of the standard polyethylene insulated conductor cables used in the Bell Sytem is a number of times greater than that of conventional paper cables. It is apparent, therefore, that many of the surge currents which made protection apparatus necessary on paper cables will cause no damage at all on polyethylene cables. For this reason, it has been decided that protection apparatus will be kept to a minimum in an effort to get realistic data on the susceptibility to damage of this type of cable, rather than to cover up data by over-protecting the cable. If experience shows that additional protection is needed for special conditions or in very high lightning incidence areas, the apparatus will be added as required.

★ ★ ★

Even with the high dielectric strength afforded by polyethylene, a number of the potentials appearing between cable—open-wire pairs and the cable sheath due to conduction of surge currents over open-wire extensions are of sufficient magnitude to break down the dielectric between the pairs and sheath in polyethylene cables. For this reason, protector blocks will be used on these pairs at the junction of these facilities. It will not, however, be necessary to protect the other non-connected cable pairs at the junction, as the induced potentials between these pairs and the sheath will not in general be high enough to cause dielectric failure. Discontinuities in the potential levels along the cable at points where subscriber's drops are connected to cable pairs will also be of less consequence, as the dielectric strength of the polyethylene insulation will be high enough to withstand most of them. This means that unprotected terminals may be more liberally used on the cable in areas where paper cables would need protection at the drop wire terminals.

★ ★ ★

When a polyethylene insulated conductor cable is connected to a paper insulated conductor cable, lightning surge currents may pass through the polyethylene cable without damaging it yet cause troubles in the paper cable. For this reason, it may be necessary to install protection on all the paper pairs at the junction of these two types of cables. Whether or not protection will in fact be applied at such junctions depends on the length and exposure of the polyethylene cable and the type of service supplied by the paper cable.

An additional safety factor is inherent in the use of polyethylene insulated conductor cables on higher voltage joint-use lines. In the event of contact between a power phase wire and the cable, the higher dielectric strength of the polyethylene conductor insulation will reduce the possibility of conductor energization due to dielectric failure. There will be a consequent reduction in the number of troubles in station fuses, in cable terminal stubs and in central office heat coils.

Protection of Rural and Urban Wires

Rural and urban wires have been developed to give a higher degree of flexibility and economy to the telephone distribution plant. Rural wire consists of 6 twisted pairs of individually insulated 19 gauge conductors, which are stranded around an insulated steel support wire. Urban wire consists of 16 pairs of individually insulated 24 gauge conductors, which are bunched into 4 groups and stranded about an insulated steel support wire. Both types of wire are tested with 10,000 volts d-c between conductors and between each conductor and the support wire.

★ ★ ★

As the two structures are very much alike in their susceptiveness to damage from foreign potential, it is possible to apply essentially the same protection to each. However, urban wire will in general be installed in shorter lengths than rural wire and consequently some of the protection specifications will not apply. In addition, the protection apparatus applied to each type may in some cases be different, due to the greater conductivity of rural wire.

★ ★ ★

The high dielectric strength insulation used on the conductors of these two types of wire give them some of the attributes of polyethylene insulated conductor cable. For this reason, protector blocks will be necessary at the junction of these wires and paper insulated cables to equalize any potential differences which may appear at

(*Please turn to page* 595)

Additional Facts About the Coming . . .

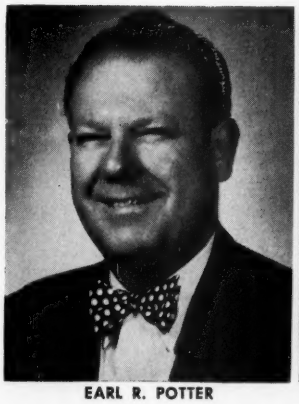
PACIFIC COAST REGIONAL MEETING of THE WIRE ASSOCIATION

THE PROGRAM COMMITTEE

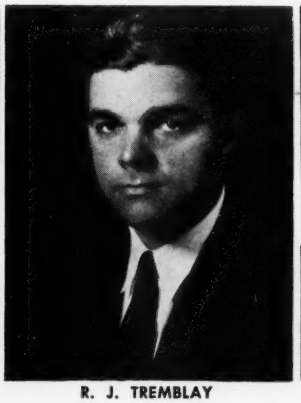
General Chairman: EARL R. POTTER, President, Industrial Wire Products Corp., Los Angeles, Cal.

Chairman of Evening Meeting: R. J. TREMBLAY, Genl. Supt., Bethlehem Pacific Coast Steel Corp., Los Angeles, Cal.

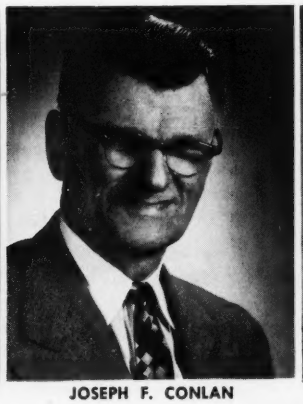
Committee Members: JOSEPH F. CONLAN, Treas., K. H. Davis, Wire and Cable Corp., Los Angeles, Cal., and J. W. EGAN, manager, Wire Product Sales, Bethlehem Pacific Coast Steel Corp., Los Angeles, Cal.



EARL R. POTTER



R. J. TREMBLAY



JOSEPH F. CONLAN

JOHN W. EGAN

Besides the program features for the day, Mr. Soracco, pictured at the right, will be the principal speaker at the evening meeting. He is District Manager of Sales for Bethlehem at Los Angeles. Details of the program are given elsewhere in this issue—see page 562.

DON'T FORGET THE DATE: JUNE 8, 1956

BETTER YET, WRITE THE STATLER HOTEL, LOS ANGELES, AND MAKE YOUR HOTEL RESERVATION IF YOU PLAN TO BE THERE OVERNIGHT.

All wire men cordially invited to attend.

LIONEL J. SORACCO

THE WIRE ASSOCIATION

RICHARD E. BROWN, *Executive Secretary*

453 MAIN STREET • **STAMFORD, CONN.**

2000 Mile Telephone Cable to Span Atlantic

by Edwin K. Langille

The new transatlantic cable now being laid will not only be the world's longest telephone line, but embodies all the latest features that will make for high efficiency. Much of the cable is being manufactured by the Simplex Wire and Cable Company of Cambridge, Mass., some interesting features of which are here presented.

Despite all the miracles which science turns out almost as a matter of routine these days, it is startling to think of 300 vacuum tubes burning away night and day for a period of 25 years three miles under the Atlantic ocean but that is what the specification calls for in the transatlantic telephone cable laid this summer.

★ ★ ★

To construct this 2,000 mile wire which crosses vast submarine canyons and climbs the deep sea ridges between Clarenville, Newfoundland, and Oban, Scotland, and which must withstand currents, pressures, cable-eating fish and freezing temperatures, is a phenomenon of precise wire engineering.

★ ★ ★

Hitherto, the longest undersea telephone cable extended 125 miles from Key West to Havana. This was made by the **Simplex Wire & Cable Company** of Cambridge, Mass., in 1949 and laid in 1950. This firm now has a large part in the manufacture of this first coaxial cable to span the two hemispheres which is to share the load of the twelve radio channels, now the only means of telephone communication between this country and England.

★ ★ ★

The cost of the project is shared by the **American Telephone & Telegraph Company,** the **British Post Office** and the **Canadian Overseas Telecommunication Corporation** and will amount to about $40 millions. The cable alone in the section laid from West to East this summer is valued around $5.5 millions or roughly about $2,800 a mile. Something like 1,800 tons of copper, 14,000 tons of steel, 2.4 million yards of cotton cloth and 1,400 tons of plastic insulation went into the cable.

Part of the cable was manufactured in England by **Submarine Cable, Limited,** a subsidiary of Submarine Telegraph Construction & Maintenance, at a new plant at Erith, on the Thames, 20 miles from London. This factory called the Ocean Works was set up expressly for this work and has a capacity of 3,000 miles of cable per year.

★ ★ ★

The American end of the production was also turned out in a new plant built by the Simplex Wire & Cable Company at Newington, N. H., where 600 men have been employed in its making for the past year and one-half.

★ ★ ★

Last June, HMS Monarch put into Portsmouth, N. H., to take on the cable. Miles of its armored length were stored in a giant tank something like what might be found at an oil refinery where the cable was kept immersed in circulating water at uniform temperature for testing. The loading was accomplished by means of a 500-foot rolling track conveyor extending from the tank shed to the dock. The cable is laid on the ocean floor at a rate of six miles an hour.

★ ★ ★

The volume to which the voice is multiplied is something fantastic and represented by a figure of ten plus 170 zeros. This is accomplished by means of 104 repeaters spaced approximately 37 miles apart. These underwater amplifiers, manufactured at Western Electric's Hillside, N. J. plant, consist of sixty tiny parts and three electron tubes each, built into seventeen lucite cases. The elongated shape is about 28 feet long and two inches in diameter and these are encased in an aluminum box 35 feet long and cushioned with Texlite.

★ ★ ★

To ship these from New Jersey to the Simplex plant in New Hampshire, it was necessary to use preheated trucks equipped with gas-burning cargo heaters travelling at a speed of ten miles an hour. Shock recording equipment was installed on each case so readings could be taken at Simplex and again on shipboard. After armoring at Simplex, the repeaters to be spliced into the English section of the cable were flown to England with special handling crews at each end.

★ ★ ★

The almost endless experimentation and testing that went into the various parts of the cable itself and its assembly were conducted under the direction of **Dr. John T. Blake,** director of research at Simplex and **W. N. Eddy,** who is in charge of production at the Newington, N. H., plant. Tests were made at 120,000 volts d. c., although not over 1,000 volts will be used in actual operation. Every day one qualification joint and three conductor test joints were made before turning out an actual cable joint.

★ ★ ★

Several thousand models were made at various temperatures and pressures before the polyethylene casing for the center conductor could be extruded at precise concentricity. An electric eye was used to gauge the material going in and coming out and concentricity, ca-

pacity and conductor diameter meters were used at various stages to insure uniformity.

* * *

Three spiral copper tapes are

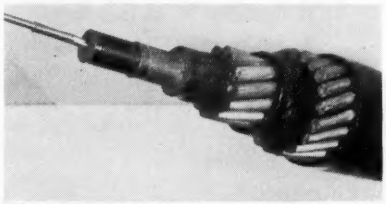


Fig. 1 Cutaway view of the transatlantic coaxial telephone cable showing layers of armor used to protect the copper conductors. * * * * * *

lapped around the solid copper conductor before adding the plastic coating. These are formed to a tolerance of less than one-half a thousandth of an inch through rollers and carboloy dies with final sizing through a diamond die. A thickness of 0.230 inches of polyethylene, especially treated for non-water absorbent properties is placed over this and six copper tapes for electrical grounding are wrapped on top of this.

* * *

In addition, there are nine other operations to perform before completing the finished cable. This core is coated with another copper tape, referred to as the teredo tape, to protect against gnawing shipworms comparable to the copper bottom put on wooden ships. This is then covered with two layers of jute applied in reverse directions and spiraled layers of galvanized steel armor wire embedded in more layers of jute and tar.

* * *

The major proportion of the cable, about 75 per cent, which lies at the greatest depths, measures 1.23 inches in diameter and weighs three tons a nautical mile. In shallow water where the cable will take a beating from the waves, a diameter of 1.85 inches, weighing 11 tons a nautical mile, is used. There is also an intermediary size of 1.43 inches in diameter, weighing six tons a nautical mile, for use at depths of 200 to 600 fathoms where the cable is exposed to strong currents.

* * *

The cable is designed for a maximum frequency of 160,000 cycles and will not be used for TV requiring a million cycles or more, but can accommodate 36 simultaneous telephone conversations. Tied to land wires and microwave relays, this should add substantially to a better understanding between nations.

Join

THE WIRE ASSOCIATION

Besides the direct benefits of being a member, those who join the Association can enjoy the feeling that they are uniting in the cooperative effort to better conditions in the industry.

ANNUAL DUES: $15.00

For this you receive the Association's Official Publication for one year — WIRE AND WIRE PRODUCTS.

You also get a copy of the directory—the WIRE AND WIRE PRODUCTS BUYERS' GUIDE AND YEARBOOK OF THE WIRE ASSOCIATION.

You are entitled to a free question and answer service on technical and operating problems.

You can attend the Annual Convention and the Regional Meetings of the Association at a saving in registration fees.

Personal contacts, too, are an advantage of the meetings.

Write today for a booklet on the Association and an application card.

THE WIRE ASSOCIATION

RICHARD E. BROWN, *Executive Secretary*

453 MAIN STREET • **STAMFORD, CONN.**

Announcing the 1956

WEST COAST REGIONAL MEETING

OF

THE WIRE ASSOCIATION

JUNE 8, 1956, STATLER HOTEL, LOS ANGELES, CAL.

Registration will be at 10 A.M. at the Bethlehem Pacific Coast Steel Corp.'s plant. After a tour of the plant, the company will serve luncheon to its guests at approximately 1 P.M. The group will see the new electric furnace, rod rolling, the fastener division and the wire mill. In the afternoon, there will be a tour of the Pacific Tube Company's plant, where the production of cold drawn bars and various types of tubing may be seen.

A get-together and cocktail hour will precede the dinner at the Statler Hotel through the courtesy of a number of West Coast companies as a fitting prelude to the evening program. There will be a drawing for door prizes.

Mr. L. J. Soracco, Bethlehem Pacific's Sales Manager, will address the group after dinner. He has had both operating and sales experience and his talk should prove interesting.

THE COST

Tickets covering the entire expense of this meeting, except for hotel rooms, will be issued to those in attendance upon registering. Prices are:

Members **$12.00**
Non-Members **$14.00**

These fees will cover registration, bus transportation and the dinner in the evening.

The Association's Board of Directors is particularly desirous of having as many Eastern wire men present as possible and extend a cordial invitation to them to be in Los Angeles in June for this meeting. Hotel reservations can be made with Statler.

This will be a splendid meeting and all wire men are urged to be present.

RICHARD E. BROWN, ***Executive Secretary***

THE WIRE ASSOCIATION

453 MAIN STREET • **STAMFORD, CONN.**

Government Wire Production Information

Announcement of New Publication

Copper Wire Tables, 4th Edition, **National Bureau of Standards,** Circular 31, issued January 27, 1956, 2 line cuts, 19 tables, 30 cents.

★ ★ ★

These tables are of special importance to workers in the copper industry, electrical engineering and related fields concerned with the distribution of electrical power. Copper wiring is used almost universally for such distribution.

★ ★ ★

The first edition of this circular was prepared in 1912 at the request of the Standards Committee of the American Institute of Electrical Engineers. It was an attempt to standardize the characteristics of a number of different wire gages in use at that time.

★ ★ ★

All data in **Copper Wire Tables** is expressed in both English and metric units. The American Wire Gage as presented in this publication is formed by geometrical progression. The circular also contains a number of very simple formulas for computing data for any size wire.

★ ★ ★

This edition represents the third revision for Circular 31. In the new revision the tables have been extended to 50 gage and up to 200°C to make them more useful to the present demands of science and industry.

★ ★ ★

Orders should be sent to the Government Printing Office, Washington 25, D. C. Foreign remittances must be in U. S. exchange and should include an additional one-third of the purchase price to cover mailing costs.

Alcoa to Build Plant in Indiana

The Aluminum Company of America has announced that it will build an $80,000,000 smelting plant on the Ohio River eighteen miles east of Evansville.

★ ★ ★

John D. Harper, general manager of Alcoa's smelting division, said the plant eventually will employ 1,200 persons and have an annual pay roll of $5,000,000.

★ ★ ★

First production is scheduled for the fall of 1957. Facilities will include ingot casting equipment, a carbo plant for making anodes used in the electrolytic smelting process, machine shops, electrical shops, a rectifier station and service installations. The 150,000-ton smelting plant will be managed by **John R. Ibach,** a thirty-one-year veteran with Alcoa.

MICROMETER PRECISION — MICRO-WELD — TRADE MARK REGISTERED

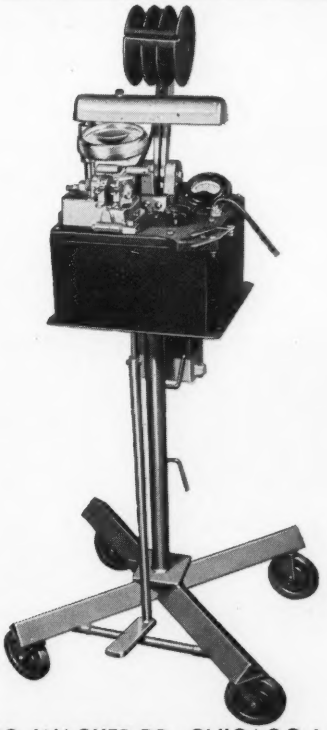
MODEL S.E.M.T. MICRO-WELD BUTT WELDER

This welder was designed and developed expressly for welding all types of fine wire: Aluminum, Copper, Brass, Bronze, Steel and Steel Alloys, ranging in size from .005" to .020" diameter.

Unit design of frame, transformer and power sub-assemblies permit other range of sizes to suit requirements.

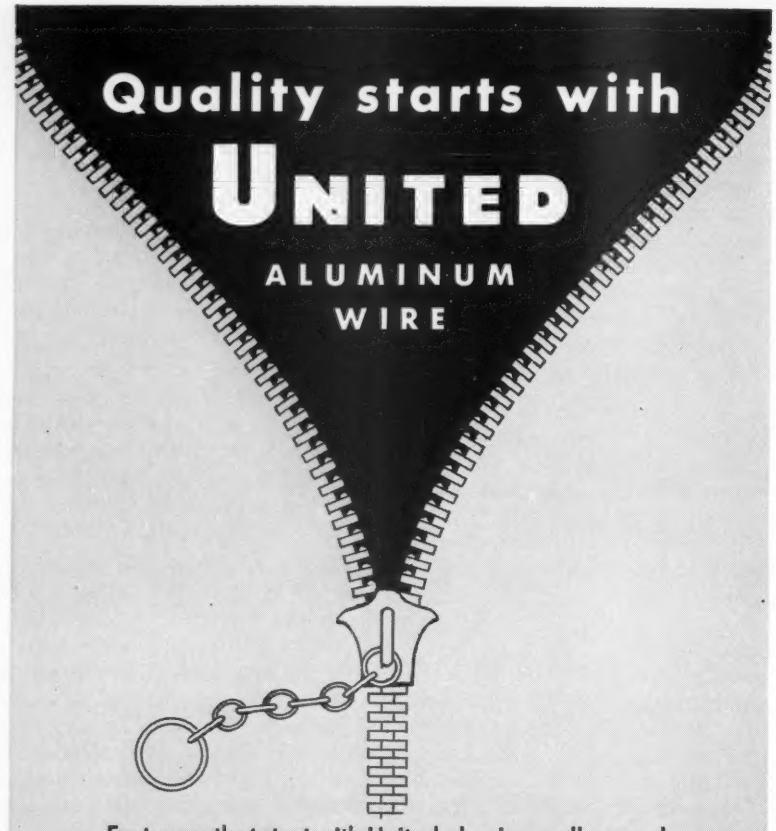
Equipped with a temperature indicating annealing and tempering device, voltage regulator and meter to compensate for voltage fluctuation, wire cutters, extra large 5" diameter magnifying glass, fluorescent light and extension cord. Welder can be supplied for bench mounting, or mounted on 4-wheel truck.

The adaptability of this unit for welding all types of wire, either ferrous or non-ferrous, in sizes from .005" to .020" diameter, makes it ideal for the fine wire manufacturer.



MICRO PRODUCTS CO.,

20 NO. WACKER DR., CHICAGO 6, ILL.
Telephone: STATE 2-7468



Fasteners that start with United aluminum alloys end with the quality of appearance, performance and durability you need in today's competitive markets.

Uniform size, finish and temper are the big reasons why United is the preferred wire. Quality control assures that all alloys have uniform cold heading properties. Available in 1100, E C, and 5056 grades.

Fasteners —

ZIPPERS
RIVETS
SCREWS
NAILS
COTTER PINS

UNITED WIRE
AND SUPPLY CORP.

Providence 7, Rhode Island

Offices in Principal Cities

Permanently United

ALUMINUM • BRASS • COPPER
WIRE AND TUBING
BRAZING PRODUCTS —
PHOSON — SILBOND

Booklet on Inks for Labeling Coding and Marking Plastics

The problem of labeling, coding or otherwise marking the surfaces of materials that steadfastly resist conventional printing methods is nearing solution with new high temperature resistant, chemically resistant fluorocarbon type pigmented inks. The properties, methods of application and uses of these inks are described in a new 4-page brochure published by **The M. W. Kellogg Company.**

★ ★ ★

KEL-F printing inks adhere tenaciously to nylon, fluorocarbon and polyethylene surfaces and can also be used for marking a wide variety of rubbers and other plastics, including rigid and plasticized vinyls. Available as either fully compounded ink concentrates or as a clear vehicle and separate pigment suspensions, the new inks can be adjusted in viscosity, drying rate and color strength to meet individual requirements. This flexibility in formulation will permit fabricators to simplify inventories and cut costs by not having to maintain special ink stocks for each plastic. Supplied in air-drying and heat-setting types.

★ ★ ★

Both types can be applied by standard printing or marked methods. Copies of the booklet are available upon request to The M. W. Kellogg Company, Chemical Manufacturing Division, Jersey City, N. J.

New "Add and Subtract" Electric Productimeter for Inventory Control

Announcement is made by the **Durant Manufacturing Company** of the addition of an "Add and Subtract" electric counter to its line of electrically operated Productimeters.

★ ★ ★

Model 5-Y-8602-MF is designed for panel mounting and comes equipped with mounting plate. The entire assembly can be placed into a panel directly from the front and securely fastened from the front.

★ ★ ★

This unit is ideal for inventory control. It adds one on impulse from one contact switch, and subtracts on impulse from a second switch. It is used in production record systems for immediate registration of stock reservation, withdrawals, or additions. It may also be used to indicate the number of pieces on a conveyor line at any time. The pieces fed into the line add counts, while the pieces removed subtract counts.

★ ★ ★

It features a modern straight-line motif, executed in two tones of silver and seal brown. The counter is totally enclosed, affording protection against dust and moisture conditions.

★ ★ ★

Overall dimensions are: 4-3/8" long, 1-5/8" wide and 2-5/8" deep. Figures are 9/64" wide by 3/16" high, white on dark background. The nu· ber wheels are high in the window for maximum visibility. Hardened steel working parts used throughout assure long life and dependable service. Operating speed is up to 500 counts per minute. Standard voltage is 110 V. 60 C. AC. Voltage fluctuations on normal industrial circuits have no effect on its accuracy.

★ ★ ★

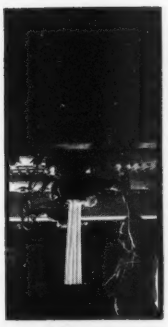
Complete details are available from Durant Manufacturing Company 1918 North Buffum Street, Milwaukee 1, Wisconsin, upon request.

Techalloy's Capacity Doubled

A new 10,000 sq. ft. addition, costing $250,000 equipped, was completed and put into operation in March, 1956, by **Techalloy Company, Inc.**, Rahns, Pa., wire, rod and strip manufacturers. It is the fifth large expansion by the company in the past two years.

★ ★ ★

The new facilities will triple annealing capacity of stainless steels in sizes ranging from 1/4—.002-in. dia. Part of the new building will be used to warehouse stainless steel spring wire. Wire and rod made by the company from Monel, nickel, Inconel, stainless and heat resisting steels, are used in a wide variety



NELCO TRADEMARK

finishes for wire and cable constructions

Formulated by specialists . . . backed by over 30 years of experience in working with wire manufacturers. Nine standard finishes are listed below. Many more are available. Consider how you can use them or how we can help you to select the exact finish for your particular problem.

NL 7147—NELCO Cable Coating
General radio hook-up and push-back wire constructions

NL 7147-S NELCO Clear Cable Coating
Similar to NL 7147 but with fungicidal agent

NL 8223—NELCO Clear High Heat Resistant Cable Coating
Meets requirements of automatic primary wire manufacturers

NL 8244—NELCO Nylon Cable Coating
A penetrating bonding coating for nylon braided constructions

NL 9776—NELCO Clear Cellulose Acetate Cable Coating
For switchboard hook-up wire constructions

R 1407—NELCO Nylon Cable Coating
For wire constructions meeting MIL-W-5086

R 2055—NELCO Anti-Fray Saturant
Prevents fraying of glass-braided wire constructions

R 4004—NELCO Flame Retardant Saturant
Good flame resistance, no color change

R 4026—NELCO High Temperature Resistant Cable Coating
Fluorinated coating for wire constructions meeting MIL-W-8777

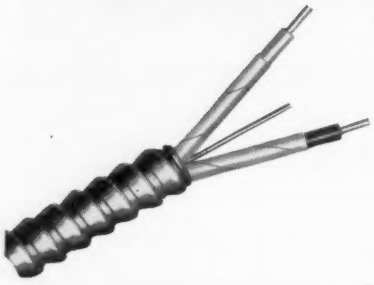
Write for our Data Sheets giving complete information on these finishes.

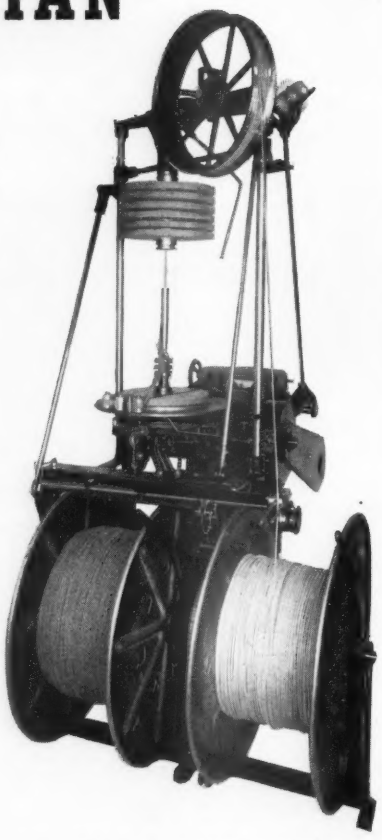
Chemical Products CP CORPORATION

KING PHILIP ROAD • EAST PROVIDENCE 14, RHODE ISLAND

WARDWELLIAN®

Paper Server for BX Conductors





An improved serving machine for applying crepe paper on conductors used in the manufacture of armored cable.

- Equipped with adjustable traverse, supply and windup stands, windup driving mechanism, electric stop-motion and capstan release mechanism.
- Equipped for adjusting lay of paper strip.
- Rate of production: 5,000 ft. per hour possible, depending upon width of material and lay.
- Serving head speed 560 R.P.M.
- Driving pulley 8" diameter; 1¾" belt. Speed 330 R.P.M.
- Capstan 18" diameter, 3" face.
- Opening through serving head ⅝" diameter.
- Supply packages 16" diameter, 3" diameter core.
- Supply tube will hold 8 reserve packages of 1" wide paper.
- Maximum power requirement ¾ H.P.
- Motor drive furnished upon request at additional cost.
- Counter for measuring production in feet.
- Stands will accommodate reels 30 inches in diameter, with overall width up to 16 inches.
- Reels not included with machine.

Note: Serving head normally runs clockwise, but can be made to run counter-clockwise if requested.

WARDWELL BRAIDING MACHINE CO.

Central Falls Rhode Island, U.S.A.

Representatives for Europe, British Colonies and Dependencies

JAMES MACKIE & SONS, LTD., BELFAST, IRELAND

of industries—electronics, electrical, nuts and bolts, springs, aircraft, automotive, jewelry, welding and screw machine parts.

★ ★ ★

Automation trends among wire users and tightening quality control standards in the industry have been major factors in the company's expanding at a faster rate than the industry average. Techalloy shipments for 1955 were four times greater than in the previous year and the expansion will enable the plant to double annual shipments this year.

★ ★ ★

New Turks Head rolling equipment is being installed along with rolling mills to produce special shaped wire such as hex, squares and flat wire with round or square edges, in size from ½" to .002" dia.

Folder Describes Bending Machine

Folder R-6, issued by **J. A. Richards Co.,** 903 No. Pitcher St., Kalamazoo, Mich., designers and builders of bending machines since 1900, illustrates and describes the company's line of bending machines.

★ ★ ★

These machines are designed to handle wire, bars, strip, etc., and are furnished with dies to form simple or complex shapes. Punching dies, mandrels and knives included.

★ ★ ★

For copies, please address the company.

New Colored Wire

The Wilson Steel & Wire Company, 4839 So. Western Ave., Chicago, has developed a new line of vinyl colored wires.

★ ★ ★

This wire comes in all standard colors—red, green, yellow, black, blue and so on—and ranges in sizes from 15 gauge and finer. According to the company, it is extremely flexible—can be rolled or twisted to any shape desired.

Arrives at Hundredth Birthday

100 YEARS PROGRESS AND SERVICE

Ludlow-Saylor Wire Cloth Company, 634 Newstead Ave., St. Louis 10, Mo., has completed 100 years of service to industry.

★ ★ ★

The company and its officers and employees express their gratitude to their thousands of customers for their patronage and confidence and on this anniversary renew their pledge of continued adherence to a policy of the finest possible quality and craftsmanship in engineering and producing woven wire cloth, screens and other products.

★ ★ ★

Besides its plant in St. Louis, the company owns and operates the Star Screen and Iron Works, Inc., 2515 San Fernando Rd., Los Angeles 65, Calif.

New Coated Glass Yarn Announced

A new development in manufacture of glass yarn, in which a coating of duPont's Teflon is applied directly to the glass, is announced by **S. W. Schulmeyer,** manager of electrical insulation sales for **L.O.F. Glass Fibers Company.**

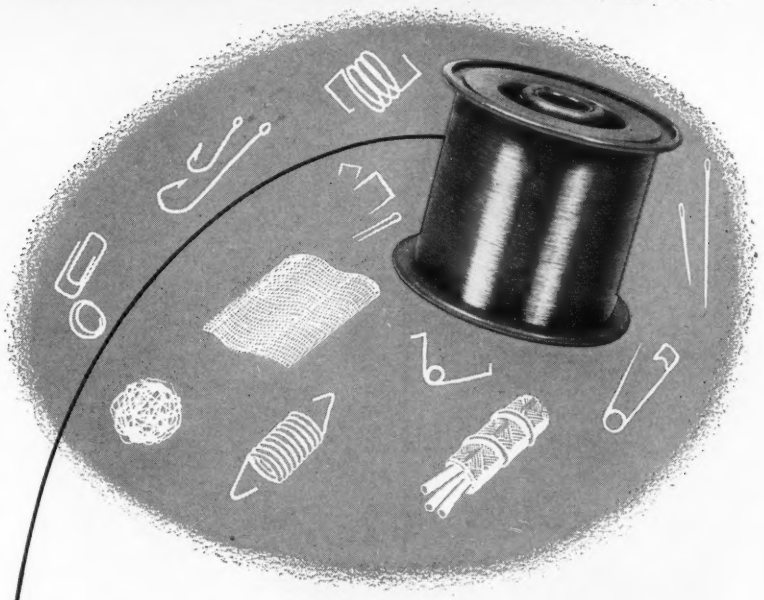
★ ★ ★

Previously, Mr. Schulmeyer said, glass yarn was braided and then coated with the Teflon. Now, with the Teflon coating applied directly to the glass before braiding, each strand of glass gets individual protection, in addition to the overall protection.

★ ★ ★

The new yarn is much more abrasion resistant and has a feeling of being slippery, an advantage in the aircraft industry, where aircraft cables have to be pulled through small and sometimes rough openings. It also is used in Navy and coaxial cable.

FOR FINE WIRE PRODUCTS . . .

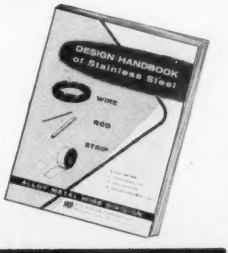


Almet Stainless Steels

MEET MORE REQUIREMENTS THAN OTHER ENGINEERING MATERIALS

Does your Fine Wire application call for resistance to heat? . . . to corrosion? Does it require good fatigue properties . . . excellent weaving or other forming characteristics? There's a good chance you will find the material you need among the more than 20 grades of stainless steel we fabricate into high quality Fine Wire. No other family of metals has the combination of properties common to the stainless steels.

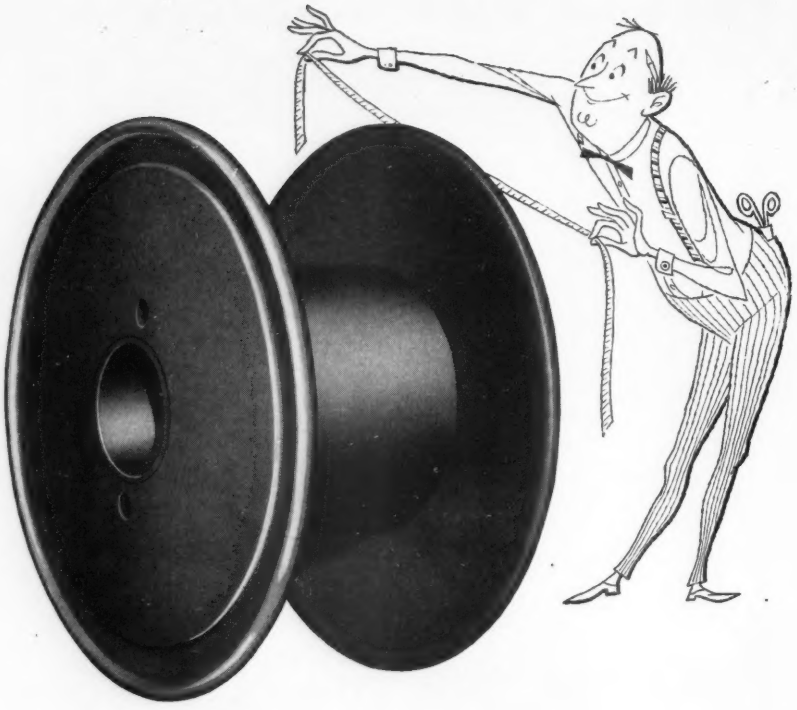
Learn more about the interesting properties and applications of our stainless steel Fine Wire, as well as our stainless Rod and Strip . . . send today for a copy of our new 40 page Stainless Steel Design Handbook.



ALLOY METAL WIRE DIVISION

HKP A DIVISION OF H. K. PORTER COMPANY, INC.

H. K. PORTER COMPANY, INC.
Prospect Park, Pennsylvania



Made To Your Measure

REELS, SPOOLS AND BOBBINS

Just as a tailor skillfully measures and shapes a suit to fit each meticulous customer, Apco Mossberg engineers design and construct steel reels, spools and bobbins for the wire industry.

Trueness and balance are all important in this age of high speeds, and Apco Mossberg reels are manufactured to extremely close tolerances established during more than fifty years of service to the wire industry.

Our engineering and service departments are ready to go to work for you. Tell us your problem . . . we will make suggestions and offer solutions without obligation. Write us or call collect . . . Attleboro 1-0340.

Pacific Coast Representative
GORDON PROFFITT
Room 501-503
24 California Street
San Francisco 11, Calif.

Canadian Representative
HUGH P. WILLIAMS & CO.
47 Colburne Street, West
Toronto, Ontario, Canada

(The original Frank Mossberg Co.)

APCO MOSSBERG COMPANY

ATTLEBORO, MASS.

ABSTRACTS

These abstracts are published through the courtesy and with the permission of the Industrial Diamond Information Bureau, 34 Holborn Viaduct, London, E.C.1, England. Inquiries regarding them should be directed to the Bureau.

MOLYBDENUM: A HIGH-TEMPERATURE STRUCTURAL METAL
W. M. Fraser, R. R. Freeman (Westinghouse Electr Corp. Lamp Div). Westinghouse Eng 1955 Vol 15 (4) pp 130-133 (July)
Supply and properties; various machining methods. Molybdenum wire produced by swaging ingot through number of dies to final dia. Starting from 0.18 in. dia, wire drawn through dies on drawbench to 0.08 in. dia, and then drawn to finish size (not generally below 0.002 in. dia) on specially designed wire-drawing machines. Sintered carbide dies used for larger and diamond dies for smaller sizes. Heat-resisting graphite as lubricant. Use as hooks supporting tungsten filament in light bulb. 6 illustr.

★ ★ ★

DRAW BENCH LOAD CALIBRATION
M. T. McGowan, H. S. Rubenstein, R. M. Treco. Bridgeport Brass Co. BRB-6 1955 15 pp (Aug 1); Nuclear Sci Abstr 1955 Vol 9 (21) p 877 (Nov 15)
Accurate method devised for determining forces involved in drawing.

★ ★ ★

WIRE DRAWING APPARATUS
F. McKnight. Mod Ind Press 1955 Vol 17 (9) pp 44-45, 48-50; noted Stahl & Eisen 1956 Vol 76 (2) p 109 (Jan 26) (In German)
Application of polishing belts prepared with diamond dust in drawing die production.

★ ★ ★

THE HAZARD OF LEAD POISONING IN LEAD DRAWING AND PATENTING OPERATIONS
L. Parmeggiani, N. Zurlo (Milan Univ). Med Lavoro 1955 Vol 46 pp 176-184; Chem Abstr 1955 Vol 49 (20) col 13850 (Oct 25) (Original in Italian)
Major source of contamination was Pb dust formed on wire surface shortly after Pb coating; hazard highest as wire emerged from coating bath, at collecting reels and dies.

★ ★ ★

INFLUENCE OF BEARING LENGTHS ON THE POWER REQUIREMENTS FOR WIRE DRAWING
Einfluss einer Fuehrungslaenge auf den Kraftbedarf beim Drahtziehen
K. H. Treptow, Stahl & Eisen 1955 Vol 75 (25) pp 1723-1724 (Dec 15) (In German)
Summary of international investigations published recently. 2 illustr.

TO SELL—ADVERTISE IN
WIRE AND WIRE PRODUCTS
It pays—send for rates
453 Main St., Stamford, Conn.

Venezuela to Have Integrated Steel Mill

Two Italian firms, **Fiat Societa per Avione** and **Innocenti Societa Generale per el Industria Metalurgica y Meccanica,** have been awarded the Venezuelan Government's steel mill contract.

★ ★ ★

The plant, which will cost $173,000,000, is expected to be in operation in the first quarter of 1958 and in full production in 1959, will be located at the juncture of the Caroni and Orinoco Rivers in southeastern Venezuela.

★ ★ ★

Development of the project is planned in two stages. The first is based on an annual production of 300,000 tons, the second on a yearly production of 421,500 tons.

★ ★ ★

Most urgently needed products such as rails for the 2,640 mile-long-network of national railroads, and basic construction materials such as reinforcing bars, wire, rods and nails, cast iron pipes for sewers and water mains, welded and seamless tubing and electrical conduit, will be produced during the first stage.

★ ★ ★

The latter stage will provide for increases in these items plus additional products such as hot and cold sheets, tinplate and galvanized sheets.

Farm Wiring to Get Attention

The First National Farm Wiring Conference will be held at the LaSalle Hotel, Chicago, Illinois, on May 3 and 4, according to **H. H. Watson,** chairman, Farm and Rural Market Development Committee, **National Electrical Manufacturers Association.**

★ ★ ★

The Conference, first of its kind to be sponsored by the NEMA Committee in cooperation with its Farm Wiring Subcommittee, will bring together top technical and promotional specialists from industry, national farm organizations, U. S. Department of Agriculture, Extension Service, U. S. Department of Agriculture and educational institutions.

Titan Brass Wire

is Hot-Extruded Annealed Drawn

for highest strength and quality

Titan Brass Wire has precisely uniform gauge . . . color . . . texture . . . temper . . . is free from physical defects. For making highest-quality rivets, bolts, nuts, eyelets, fasteners, screws, studs, binding posts, terminals, washers, pins and nails . . . order Titan Brass Wire. Compositions and tempers are supplied to meet every requirement. Let us help you choose the proper wire composition and temper for **Heading & Extruding**
Heading & Drilling or
Forming & Bending

Call your nearest Titan Office

Offices and Agencies in these cities:

Atlanta	Denver	New Orleans	Seattle
Camden	Detroit	New York	St. Louis
Chicago	Houston	Old Lyme, Conn.	St. Paul
Cincinnati	Indianapolis	Salt Lake City	Toledo
Cleveland	Los Angeles	San Francisco	Washington

Mill Depots: Bellefonte, Pa., and Indianapolis

Write today for free folder "Titan Brass Wire" listing grain sizes, weights, tolerances and other data. Address: Customer Service Division, Titan Metal Mfg. Co., Bellefonte, Pa.

Titan®

METAL MANUFACTURING COMPANY

General Offices & Plants: Bellefonte, Pa.

Quality Alloys by Brass Specialists

KEYSTONE XL COLD HEADING WIRE

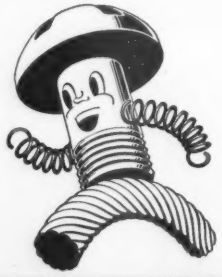
COSTS REDUCED ON THESE COLD HEADED PARTS

FOR CUSTOMERS OF...

"ROCKFORD" Screw Products Co.

These fasteners are but a few of thousands that fill the needs of customers of Rockford Screw Products Co., cold heading specialists of Rockford, Illinois. Large or small, recessed, upset or solid heads —there's hardly a size or shape part this well-known producer has not successfully headed.

The *flowability* characteristics of Keystone "XL" Wire have played an important role in the development of extreme cold headed parts today. As a result, more and more users of fasteners have converted to the modern, cost-cutting cold heading method because of the great savings in production time and materials. Keystone metallurgists have kept pace with these increasing demands, constantly improving wire quality for better finished products, free from defects, with greater die life, longer runs — and lower costs. Perhaps modern, cold heading methods can reduce your fastener costs. Keystone does not "cold head," but supplies the quality wire to solve the toughest, most intricate forming problem.



FREE BOOKLET—"FACTS ABOUT COLD HEADING WIRE"

A new, technical booklet, containing many illustrations, may help you with your fastener problem. Write for your free copy. And, remember, Keystone makes quality wire for all kinds of industrial needs. Your inquiries are invited.

KEYSTONE STEEL & WIRE COMPANY, Peoria 7, Illinois

KEYSTONE WIRE *for Industry*

The growing application of electric equipment in agriculture has resulted in an estimated total market of over $4,000,000,000 in labor and materials to modernize farm wiring systems. The speed-up in the use of more and more electrically - powered production equipment has resulted largely from the expansion of farms and the diminishing supply of available labor.

★ ★ ★

One of the by-products of the Conference may be the organization of a Farm Wiring Plan Committee, consisting of representatives of all national bodies interested in better wiring on farms to consider effective ways and means of solving recurring farm electrification problems through regional as well as national meetings, and by the development of practical aids of all types to help inform, promote and sell adequate wiring to farm people.

Libraries Association to Meet in Pittsburgh in June

The Metals Division of the **Special Libraries Association** will hold a convention in Pittsburgh from June 4th to 7th at the William Penn Hotel.

★ ★ ★

Themes for the meeting will be "Putting Knowledge to Work" and "Creative Thinking".

★ ★ ★

The program for the Metals Division will include papers on "Characteristics of Creative Thinking—with Examples of Its Use"; "Some Creative Writing Opportunities Open to Metals Librarians"; and "Creative Thinking in Metals Libraries". There will also be an open house for the Metals Division in the evening of June 4th. Convention and post-convention field trips are offered.

★ ★ ★

Mrs. Virginia Seidell, Librarian for **International Nickel Company,** New York, will preside at the Metals Division session. Further information may be secured from **G. D. Anderson,** Pittsburgh Consolidated Coal Co., Library, Pa.

Outstanding Personalities of the Wire Industry

Walter A. Richards

Walter A. Richards, President of **Micro Products Company,** Chicago, manufacturers of welding equipment, died on March 27, 1956, in Phoenix, Arizona, at the age of seventy-four. His death followed that of Mrs. Richards by exactly four weeks to the day.

★ ★ ★

Mr. Richards was a resident of suburban West Chicago and had served on the city council there. Twenty years ago he started the development of the Richards Ranch at Chandler, Arizona, which had become one of the show places of the Phoenix area. He was a Knight Templar and a member of the Arizona Club. Funeral services were held in West Chicago on April 2nd.

★ ★ ★

Surviving is his son, Walter A. Jr., who recently was appointed Vice President of the Micro Products Company. Mr. Richards was well known in the wire industry for his line of butt welding equipment for wire and rod.

★ ★ ★

WALTER A. RICHARDS

He had been a member of **The Wire Association** continuously for twenty-seven years, having been one of its original members, for which distinction he was awarded a Silver Anniversary Membership Certificate at the Annual Convention of The Association in 1954.

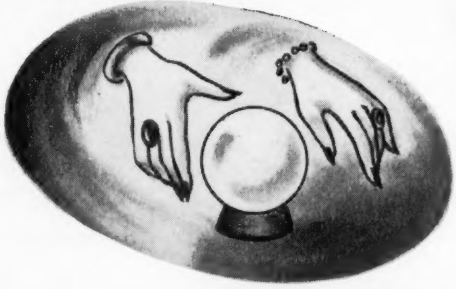
C F & I Moves Chicago Office

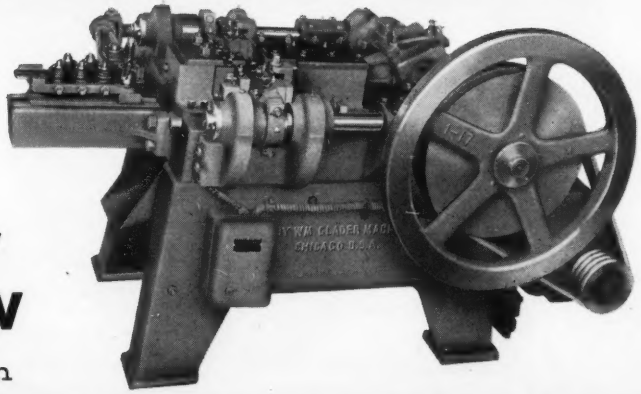
The Colorado Fuel and Iron Corporation has moved its Chicago district sales office and warehouse to larger quarters, it was announced today by **H. C. Allington,** vice president in charge of sales, Eastern Division.

★ ★ ★

The new CF&I sales office and warehouse are located at 3838 West 51 Street, Chicago 32, Illinois, Telephone: Ludlow 5-8000. District Sales Manager is **L. J. Renner.**

IF THERE'S A NAIL MACHINE IN YOUR Future make it a GLADER





11 SIZES OF MACHINES

AVAILABLE NOW

Write for 12 Page Bulletin

Wm. GLADER MACHINE WORKS 210 N. RACINE AVENUE CHICAGO 7, ILLINOIS

EXPORT DEPT. 122 EAST 42ND STREET • NEW YORK 17, N. Y.

Micro Products Elects Officers

Micro Products Company, 20 No. Wacker Drive, Chicago 6, Ill., has announced the election of **W. A. Richards, Jr.** as President and of **G. L. May** as Vice-President and General Manager of the Company. Micro Products has been long and favorably known for its butt welding equipment for the wire industry.

Metal Carbides Appoints Washington Representative

Metal Carbides Corporation, Youngstown, Ohio, has announced the appointment of **Joseph W. Mullen,** Suite 716, Dupont Circle Building, 1346 Connecticut Avenue, N. W., Washington, D. C., as representative in the Washington area. Mr. Mullen formerly represented Norris-Stamping and Manufacturing Company of Los Angeles.

Surface Combustion Appointments

Appointments in the Toledo industrial division of **Surface Combustion Corporation** involving **Henry M. Heyn, Carroll Cone** and **Donald Beggs** were recently announced by **Frank H. Adams,** President.

★ ★ ★

Mr. Heyn, a Vice President of the corporation, has been named General Manager in charge of all functions of the division.

★ ★ ★

Mr. Cone, recently named Chief Engineer, assumes full responsibility for all engineering activities; Mr. Beggs, formerly Assistant Research Director, becomes Manager of Research and Development.

American Brass Appointments

The appointment of **Gilbert C. Strubell** as Works Manager of the Torrington Division of the **American Brass Company** has been announced by **John A. Coe, Jr.,** President. Mr. Strubell has been serving as Assistant Works Manager since last June. He succeeds **Lucius H. Bassett,** who has been assigned to the task of organizing A.B.C.'s new aluminum fabricating division in Terre Haute, Ind.

★ ★ ★

President Coe has also announced the selection of **Warren C. Bogue** as Production Supervisor of the Terre Haute Aluminum division. Mr. Bogue has been Production Manager at the Torrington division.

To Assist in Management of All Auto-Lite Plants

Appointment of **Robert E. Valk** as his Administrative Assistant has been announced by **H. E. Hasemeyer,** Vice President in charge of production of **The Electric Auto-Lite Company.**

★ ★ ★

He will aid Mr. Hasemeyer in managing Auto-Lite's 30 plants in the United States and Canada.

★ ★ ★

A native of Muskegon, Michigan, Mr. Valk was graduated from the University of Michigan in 1938 with a bachelor of science degree in mechanical engineering.

(ILLUSTRATED)
42" x 20" x 21"—(4000# cap.)

HEAVY DUTY
BREAK-DOWN REELS

1000#
2000#
4000#
} capacities

Rugged Design including patented DURA-CURL rim, and many other features necessary to provide the *Strength* and *Durability* needed for continued successful performance.

Also complete line of sizes of Modern High Speed Wire Drawing NO-CREV Spools and Reels for both fine and intermediate size wire.

Mossberg PRESSED STEEL Corporation

18 WEST ST., ATTLEBORO, MASS., U.S.A.

Telephone
Attleboro 1-0848

James Day (Machy) Ltd.
28 Maddox St.
London W.I. England

#103

Signode Appoints Sales Executive

Signode Steel Strapping Co., Chicago 47, Ill., announces the appointment of **Joseph F. Beckman** to the position of Assistant Director of Sales and Manager of Steel Industry Sales.

★ ★ ★

Mr. Beckman has had a long and valuable career with Signode. He joined the company in 1925. In 1943, he was appointed District Sales Manager of the Los Angeles area and in 1950, promoted to District Sales Manager of the New Orleans area.

★ ★ ★

His accumulated knowledge of steel strapping and its applications for product protection and shipment will be of great benefit to the steel industry.

Named Titchener Sales Engineer

Howard Brown has been appointed divisional Sales Engineer by **E. H. Titchener & Company,** Binghamton, N. Y., designers and manufacturers of wire parts and welded wire assemblies.

★ ★ ★

His territory will include the State of Michigan, northeastern Indiana, and northwestern Ohio, with headquarters at 1500 Piedmont, Detroit, Michigan.

Made General Sales Manager of Glass Company

Don W. Lyon has been elevated to General Sales Manager of the Textile Division of **L. O. F. Glass Fibers Company,** Toledo, Ohio, it was announced by **J. M. Johns,** Vice President and director of sales. He succeeds **C. F. Hegg,** who recently was named to head a new automotive sales division.

★ ★ ★

Mr. Lyon will supervise sales of the company's glass textile yarns and roving to weavers and to the electrical, plastic and allied industries. These include such applications as insulation for electrical motors, wires and cables, reinforcements for laminated and molded plastic products, paper, tape and gypsum products; and yarn for industrial and decorative glass cloth.

Auto-Lite Appoints Manager at Hazleton

The appointment of **Edward A. McNally** as Manager of **The Electric Auto-Lite Company's** wire and cable plant at Hazleton, Pa. was announced recently by **H. E. Hasemeyer,** Vice President in charge of production.

★ ★ ★

Mr. McNally has been with Auto-Lite for 28 years, 15 of which were spent at the company's wire and cable plant at Port Huron, Michigan. He joined Auto-Lite in 1928 and was instrumental in starting the Hazleton operations in 1949.

Warehouse Sales Manager Named by Riverside Metal

Frank H. Conant has been named Assistant Sales Manager in Charge of Warehouse Sales for The **Riverside Metal Company Division, H. K. Porter Company, Inc.**

INTERNATIONAL *Fine Wire Co., Inc.*

INTERNATIONAL FINE WIRE CO., INC. — FINE WIRE • STRANDED • CABLED — IN ALL METAL ALLOYS — MIDLAND PARK NEW JERSEY

Precision Wire Drawn to Your Specifications

RESISTANCE WIRE

Electrical Resistance Wire Alloys:

ACCROHM A • ACCROHM 800 • ACCROHM 30
ACCROHM C • ACCROHM 294 • ACCROHM 60
ACCROHM D • ACCROHM 290 • ACCROHM 90
• ACCROHM 180

NICKEL • SILVER PLATED COPPER • MONEL
ALL TYPES OF STAINLESS STEEL

In Special Tempers, Annealed, Bunched and Stranded, etc.

1 GREENWOOD AVENUE • MIDLAND PARK • NEW JERSEY
Telephone: Gilbert 4-2151

Mr. Conant was formerly Sales Manager at the **Spencer Wire Corporation** in Union, N. J. His experience includes seven years in the copper alloy wire industry.

To Head Plastic Sales for Bakelite

Appointment of **John D. Benedito** as General Sales Manager, **Bakelite Company, Union Carbide and Carbon Corporation's** plastics division, is announced by **C. W. Blount,** Vice President in Charge of Sales. Mr. Benedito joined Carbide in 1935, following his graduation from Yale. He succeeds **H. K. Intemann,** who has been named Executive Vice President of Electro Metallurgical Company, also a division of Carbide.

Beryllium Corp. Elects Directors

Election of three directors by the board of **The Beryllium Corporation,** producer of beryllium and its alloys, was announced by **Matthew J. Donachie,** president.

★ ★ ★

The three, all officers of the firm, are **Lawrence F. Boland,** vice president sales; **William D. Gamon,** vice president; and **Walter R. Lowry,** treasurer and assistant secretary.

★ ★ ★

The company has also announced the appointment of **Gordon F. Simons** as Director of Engineering and Development. He was formerly Works Manager.

National Electric Products Appointments

Francis J. O'Brien has been named Works Manager of the Ambridge Plant of **National Electric Products Corporation,** succeeding **Leo F. Brown.** He was formerly Manager of Production. His previous position was filled at the same time by the appointment of **David G. Woodman** as the new Manager of Production.

Crucible Steel Appoints Engineers

Crucible Steel Company of America has appointed **Bernard L. Jones** to the newly-created position of Chief Engineer for the Company, according to **Joel Hunter,** President. At the same time Mr. Hunter announced that **Tore Wallin** has been named Assistant Chief Engineer.

★ ★ ★

Both Mr. Jones and Mr. Wallin have been members of Crucible's engineering staff and will continue to maintain offices at the Company's headquarters in the Oliver Building, Pittsburgh, Pa.

Named Technical Director by Vascoloy

George T. Brennan, general manager, has announced the appointment of **Edgar W. Engle** as technical director of **Vascoloy-Ramet Corporation,** Waukegan, Ill. Mr. Engle will be responsible for V-R's expanded research, development and application engineering activities in the cemented carbide cast non-ferrous alloy field.

Appoints Works Manager

George W. Evens has been appointed to a newly created post of Works Manager with **La Salle Steel Company** at Hammond, Indiana, effective immediately, according

When wrapping your wire or rod

...REMEMBER

It's the Crinkle in the PAPER that COUNTS!

For a tighter, more compact wrap, specify—
"Arksafe" CRINKLED KRAFT WIRE WRAP

Easy to handle, simple to apply. Uniform crepe—Strong and *Economical*, too!

CONSTRUCTION: Single ply, waxed, asphalt laminated and reinforced.

In Standard Rolls and Widths for use on all types of wrapping machines. Also available in Hand Rolls.

For details, write Department WP-1.

ARKELL SAFETY BAG COMPANY
70 EAST 40th STREET NEW YORK 16, N. Y. (Established 1896) 6345 WEST 65th STREET CHICAGO 38, ILLINOIS
Plants: Chicago, Illinois, and Newport News, Virginia

to **T. L. Kelly,** President.

★ ★ ★

Mr. Evens assumes many of the responsibilities previously held by the late **Theodore S. See,** who was Vice President in Charge of Operations. He served as General Superintendent of the La Salle plant over the past 27 years. His long experience in the cold finished steel bar business qualifies him well for his new assignment.

G. E. Gives Goodwin New Assignment

Paul A. Goodwin has been appointed manager of technical service in the marketing section of **General Electric Company's** Silicone Products Department, **T. C. Ohart,** manager of marketing, has announced.

★ ★ ★

Formerly a market development specialist in the Chemical Development Department of G. E. at Pittsfield, Mass., Mr. Goodwin's new assignment will be to direct technical service activities in the fields of silicone fluids, resins, emulsions and specialty products. Effective March 1, he was moved with his staff to the Silicone Products Department at Waterford.

To Handle Tool Steel Sales

Norman W. Calkins has been appointed Manager of Tool Steel Sales for the **Universal-Cyclops Steel Corporation,** Bridgeville, Pa.

★ ★ ★

Mr. Calkins had been Assistant Manager of Tool Steel Sales prior to his new position. He had been a member of the sales staff for **The Carpenter Steel Company** for nine years, serving on the export division and home office sales staff. He will make his headquarters at Cyclops Division, Titusville, Pennsylvania.

NEMA Adds to Membership

Five companies were approved for membership in the **National Electrical Manufacturers Association** on March 15th. The additional companies, which include **Sunbeam Corporation** and **Daniel Woodhead Company,** both of Chicago, bring the total membership in NEMA to a high point of 570 firms.

★ ★ ★

Sunbeam is one of the nation's largest manufacturers of electric housewares and Woodhead is a manufacturer of wiring devices.

★ ★ ★

Other companies are Republic Steel Corp., Cleveland, O.; **Metal-Craft Products Co., Inc.,** Philadelphia, Pa., and the **R T & E Corporation,** Waukesha, Wis.

★ ★ ★

Republic is affiliated with the Association's Rigid Steel Conduit and Electrical Metallic Tubing Section; Metalcraft with the Industrial and Commercial Lighting Equipment Section, and the R T & E with the Lightning Protective Devices Section.

MASON *lightweight, non-returnable, lithographed spools for:* **INSULATED WIRE · SOLDER WIRE THERMO-COUPLE WIRE · TV LEAD-IN WIRE AUTOMOTIVE CABLE**

BEST FOR LESS! That's what 175 leading manufacturers say about Mason Spool dependability and performance.

And they help you sell, too! Mason lithography (to meet your specifications) will always assure color uniformity and sharpness of detail for *instant brand identification.*

MASON lightweight, non-returnable spools are available in 5", 6½", 8½", and 10½" head sizes. All sizes are available with 1⅛" (Dia.) barrel. The 10½" head size is also available with a 3½" (Dia.) barrel. Barrel lengths from ⅝" to 14".

Tell us about your spool requirements NOW! We'll prove Mason Spools keep costs down—sales up! Telephone East Providence 1-2810 or write:

MASON CAN COMPANY
1949 Dexter Road, E. Providence 14, R. I.
Branch Plant — Greenville, Ohio

Siegfried Joins Ansonia

Alden P. Lunt, President of **The Ansonia Wire & Cable Company** announced two organizational changes in the Company's Engineering Department, effective February 1, 1956.

★ ★ ★

Victor Siegfried has been appointed Power Cable Engineer and will be responsible for coordinating and developing the engineering of plastic insulated wire and cable for power uses. Mr. Siegfried, a graduate of Stanford University, and past Vice President and Director of A.I.E.E., was formerly Chief Research Engineer of the Electric Cable Works of **American Steel and Wire.**

★ ★ ★

Hugo W. Biskeborn has been appointed Chief Engineer. He has been Cable Research Engineer since joining the organization in 1954 and has a long and successful background in both power and communication cable engineering.

Adds to Customer Service Staff

Robert T. Bailiff, having completed an executive training course with **L. O. F. Glass Fibers Company,** Toledo, Ohio, has been assigned as Customer Service Assistant, **Raymond Petersen,** Manager of the Customer Service Department, has announced.

★ ★ ★

A graduate of the University of Toledo, he holds a Bachelor Degree in Business Administration, having majored in marketing and advertising.

Two J & L Men Promoted

Peter P. Somerville, R. D. #3, Muncy, Pa., Plant Manager of **Jones & Laughlin Steel Corporation's** Wire Rope Division, at Muncy, has been appointed General Manager.

★ ★ ★

Ivan N. Latimer, 1454 Senior Drive, Pittsburgh, Field Supervisor of the Wire Rope Division, has been named Assistant General Manager.

★ ★ ★

All operations of the Wire Rope Division will be headquartered at Muncy, Pa.

★ ★ ★

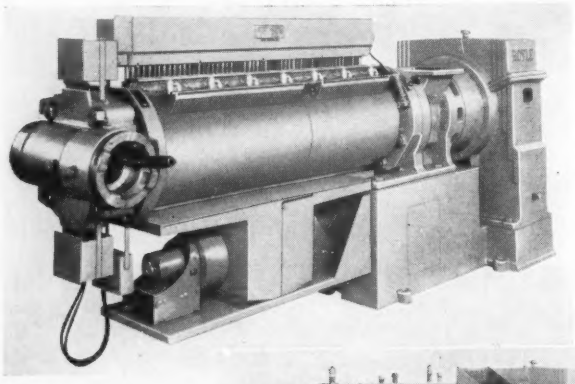
Mr. Somerville, a graduate of Notre Dame, joined J&L in 1938 as Superintendent of the Muncy Plant. Prior to that he was employed by Williamsport Wire Rope Company and by Bethlehem Steel Corporation.

★ ★ ★

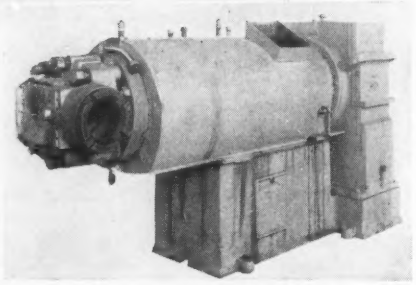
Mr. Latimer attended the University of Pittsburgh and joined J&L in 1929.

Made Labor Relations Administrator

Crucible Steel Company of America has appointed **Austen B. McGregor** to the position of Labor Relations Administrator according to an announcement by **Van H. Viot,** Vice President of Employee Relations.



8½" Spirod extruder with side delivery head for jacketing. Up-graded from circulating type shown to the right.



EVER THINK OF UP-GRADING TO SPIROD®?

Yes, it can be—and is being—done. And Royle's traditional approach to extruder development, the retention of features that have stood the test of time, makes it possible. The one-piece cylinder with built-in hopper is replaced by a separate cast steel hopper section, a cast steel cylinder with deep grooves that create fin-like separations for the rod type heating elements and the selective evaporative cooling equipment. Head and stock screw, as usual, are designed for process requirements.

If you are operating an older type Royle extruder you should investigate up-grading to Spirod—the electrically heated extruder with high velocity evaporative cooling—for maximum efficiency in controlled operating temperatures.

Write for Bulletin # 463

JOHN ROYLE & SONS ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

London, England — James Day (Machinery) Ltd. — Hyde Park 2430 - 0456

Home Office — V. M. Hovey J. W. VanRiper — SHerwood 2-8262

Akron, Ohio — J. C. Clinefelter — BLackstone 3-9222

Los Angeles, Cal. — H. M. Royal, Inc. — LUdlow 9-3261

Tokyo, Japan — Okura Trading Co., Ltd. — (56) 2130 - 2149

Mr. McGregor's major responsibility will be to coordinate the labor relations functions of the Company and to render staff service to plant locations.

Cyclone Fence Appoints Executive

Richard Kimmel has been appointed administrative assistant to **Roy E. Pinniger,** vice-president and general manager of the **Cyclone Fence Department** of **American Steel & Wire Division of U. S. Steel Corp.**

★ ★ ★

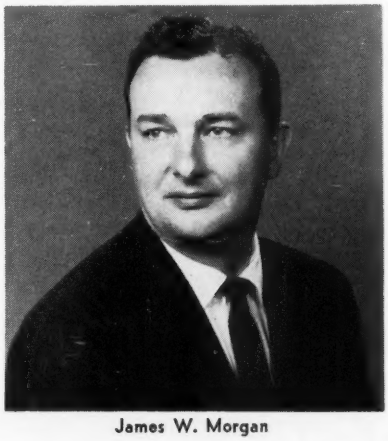
Mr. Kimmel will come to Waukegan from Cleveland headquarters of the Wire Division where he has been staff assistant to President **Walter F. Munford.**

Apex Alkali of Philadelphia Appoints Representative to cover Southern States

James W. Morgan of Atlanta, Ga., has been added to the Apex staff to represent them in the field of metal working lubricants and cleaning compounds in the South.

★ ★ ★

Jim Morgan originally came from Buffalo, N. Y., having graduated from the University of Buffalo, School of Business Administration.



James W. Morgan

★ ★ ★

His business career started with the Madison Wire Company in Buffalo. He then entered the service and rose to the rank of 1st Lt. in the Medical Adm. Corps attached to the Air Corps.

★ ★ ★

After five years of service, he returned to the Wire Industry which eventually led to his sales career with Nukem Products in the capacity of Southeastern Sales Manager, and the establishing of his business and home in Atlanta.

★ ★ ★

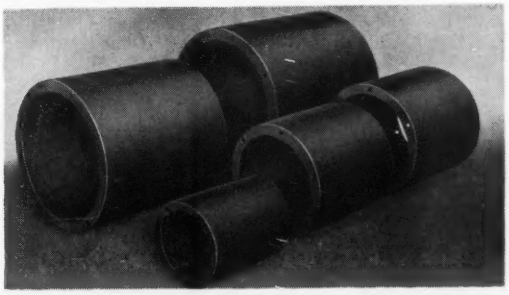
Several years direct contact with the Metal Processing Industry resulted in his becoming a manufacturers' agent servicing this field in the growing South.

★ ★ ★

Ever alert to add new men who will serve their customers intelligently and helpfully and assist with their program of expansion, Apex Alkali is happy to have Jim Morgan on their staff. His offices are at: 5051 Northland Dr., N. E., Atlanta, Ga.

STEEL TRAVERSES FLANGED STEEL DRUMS FOR REELS for WIRE • CABLE • WIRE ROPE

Plain, Painted or Hot-Dip Galvanized Finishes



Left: Assembly of flanges and drums.
Above: Hubbard Steel Traverses (drums).

Made for use with nailed, plywood, metal bound and cast flanges.
Furnished in steel—with plain or flanged ends. Easy to assemble and repair.

HUBBARD MAKES A COMPLETE LINE OF SPOOLS and REELS—ALL CONSTRUCTIONS

We invite your inquiries

HUBBARD SPOOL COMPANY

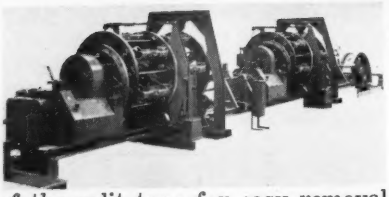
GARRETT (Tel.: Garrett 840) INDIANA

"Duplex" Type High Speed Horizontal Stranding Machine

Pictured is the above machine, which is comprised of three cages, each containing 12 bobbins 20" diameter x 10" traverse in two bays of 6, totalling 36 bobbins in all. The main features of this machine as detailed below combine in decreasing actual operating time due to the simplicity of the wire threading arrangements, tension setting, etc.

★ ★ ★

The bobbin cradles are constructed of steel in box section and are



of the split type for easy removal without the necessity of dislodging the rotor discs. Incorporated in each bobbin cradle is an adjustable tensioning device which always remains constant when changing bobbins, eliminating the usual brake tension cords which have to be adjusted whenever a change of bobbin is made. Self-locking adjustable regulating bushes are fitted to take up side play if various overall widths of bobbins are used.

★ ★ ★

The steel cradles float in ball bearings in truly balanced cages and are supported on hollow steel shafts of large diameter. These shafts or barrels are held at the inlet ends in massive pedestals fitted with heavy double-row self-aligning roller bearings. The front ends of the cages are supported on disc type bearings running on two adjustable double ball-bearing mounted support rollers, leaving the stranding point open and accessible and allowing the wires to pass straight from the cradles to the die.

★ ★ ★

The wires from proceeding cages pass along the outside of the hollow steel shaft so that they are always in view when passing from the bobbins to the stranding point. Large diameter grooved rollers are fitted at the outlet end of the cradles.

★ ★ ★

The machine is capable of providing a cage speed up to 110 revolutions per minute in either direction.

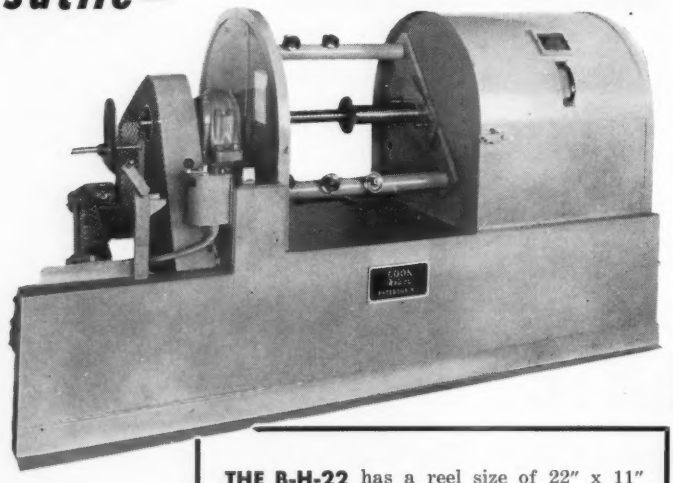
★ ★ ★

On the "Duplex" type of strander, a secondary haul-off capstan is provided after the first cage so that the machine can be used as two separate units if desired. For this reason, two slip ring motors and drum type controllers are fitted, but when the machine is used as one complete unit, both sections of the stranding machine are connected electrically and mechanically by one control and the main motor only is used. On the machine shown 8 foot diameter haul-off capstans are fitted complete with fleeting rings.

★ ★ ★

The manufacturers, **Messrs. B. & F. Carter & Co.**, Albion Works, Bolton, England, who offer a complete range of Electric Cable and Wire Rope Machinery including Stranding, Armouring, Laying-up and Closing Machines, will be pleased to provide any additional information.

A COOK BUNCHER — STRANDER
is versatile—



takes less space

THE B-H-22 has a reel size of 22" x 11" and a capacity of 500 lbs. and, like all Cook Bunchers, has successfully formed bunched strands of 7, 10, 16, 19, 26, 41 and 65 wires with such concentricity as to enable its passage through an extruding die of only 1 mil clearance. In addition, such constructions as 27/36 and 41/36 have been bunched, at high speed, with perfect concentricity on this versatile machine.

OTHER MODELS

BH-8
BH-12
BH-16
BH-24

- **HIGH SPEED**
- **SINGLE TWIST FLYER**
- **AUTOMATIC LAY CONTROL**
- **LARGE TAKE-UP REEL**

Write today, for descriptive literature giving details of construction and performance

A Complete Line of Quality Machinery For The Wire and Cable Industry To Meet Rigid Specifications.

COOK MANUFACTURING CO.

50 EAST 25TH STREET, PATERSON, N. J. • ARMORY 4-6380

New Booklet Shows Entire Range of Waterbury Farrel Equipment

In a new 12-page booklet entitled "4 in 1", the **Waterbury Farrel Foundry & Machine Co.**, Waterbury, Conn. gives a comprehensive picture of the four basic lines of metalworking machinery it builds.

★ ★ ★

Using a picture-and-caption treatment, the catalog shows the various types of mass-production equipment produced by Waterbury Farrel's Cold Heading Equipment Division, Power Press Division, Rolling Mill Machinery Division and Wire Drawing Equipment Division. No details are given on the particular machines, as the purpose of this booklet is simply to indicate the scope of Waterbury Farrel products.

★ ★ ★

The Cold Heading Equipment section shows a variety of headers, threaders, slotters, and related bolt and nut machinery. The Power Press section includes eyelet machines and multiple plunger presses, as well as blanking, transfer, horizontal and other press equipment. The pages covering Rolling Mill Equipment picture both conventional and Sendzimir strip mills, a tandem rod mill, a wire flattening mill and different kinds of auxiliary mill equipment. Both continuous tandem and upright cone wire drawing machines are illustrated in the section on Wire Drawing Equipment along with other units used in this field.

★ ★ ★

Free copies of this catalog are available on request from Waterbury Farrel Foundry & Machine Co., Waterbury, Conn. Ask for the "4 in 1" booklet.

Company Now Insulating Its Wire

Welcraft Products Company, Inc., New Carlisle, Ind. manufacturer of thermoplastic insulated lead wire and resistance wire for a wide variety of applications in the appliance industry, according to an announcement by **Herbert O. Leipold**, Vice-President and General Manager, is insulating its wire, where in the past, the wire which went into Welcraft products was purchased from outside sources.

★ ★ ★

Approval from both Underwriters' Laboratories and Canadian Standards for the manufacture of its wires has been received, specifically covering the company's thermo-plastic insulated lead wire and heater wire used in refrigerators, freezers, electric blankets and air conditioners. Both lead wire and mullion wire received approval to 105° C.

★ ★ ★

The firm also announced the availability of an experienced engineering staff to work directly with appliance designers and manufacturers in the development of special applications.

Have You Read

"STEEL WIRE

IN AMERICA?"

by Kenneth B. Lewis

The price is $15.00

PLYMKRAFT

CABLE FILLER GIVES YOU MORE

MANUFACTURING ADVANTAGES

You get the exact put up that works best on your equipment with any type treatment—wax, jute saturant, anthracene.

ENGINEERING ADVANTAGES

You get a proven cable filler made to fine tolerance, one that's always uniform and twisted to your exact specifications.

DESIGN ADVANTAGES

Products available in standard or made to the users' specifications. Cable filler inquiries or problems welcome, samples upon request. Write to:

PLYMOUTH CORDAGE COMPANY

Plymouth, Massachusetts
New Orleans, Louisiana
Warwick, Virginia

PLYMOUTH TRADE MARK 1824

New Wire Weaving Loom Developed

A revolutionary new loom for weaving wire cloth has been developed by the **American Wire Fabrics Corp.**, Mount Wolf, Pa., wholly-owned subsidiary of **The Colorado Fuel & Iron Corp.** Termed an "Anti-Friction" loom, the new machine represents significant improvements in both speed and efficiency over older looms through the use of ball and roller bearings throughout. The loom was developed by **Bent Weaver,** executive vice president of the Mount Wolf plant. It has been named the "Franz" anti-friction loom, for **A. F. Franz,** president of the parent company.

★ ★ ★

The new loom can operate nearly 10 per cent faster than conventional looms on 36 inch fabric and features completely automatic operation, with push button controls throughout. The "Franz" loom has already undergone a stiff series of test runs at the plant, and is now in full scale production at Mount Wolf.

★ ★ ★

The American Wire Fabrics Corporation is a leading producer of insect screening.

WIRE and WIRE PRODUCTS

reaches many prospects

YOUR SALESMEN DON'T KNOW!

No matter how big you are, the odds are you don't know all your actual prospective customers.

If your company is small, it is even more important to be "calling" on your prospects and customers regularly through advertising.

Your advertising in Wire and Wire Products will be seen by many people in the plants you wish to "sell" whom your salesmen never would see, yet who specify, actually buy or who influence decisions on products to be purchased. Your advertising is bound to be of immeasurable value to you, too, in paving the way for a good reception for your salesmen when they do call. And the field's buying power is tremendous!

WIRE AND WIRE PRODUCTS circulation, is all paid. We have no agents, offer no premiums or make special inducements to get circulation, except the value of the editorial contents in itself—yet our renewals have averaged 97% or better for many years. That's why it is a good and forceful advertising medium for all concerns who have products to sell to the wire industry.

- **GET YOUR SHARE OF THE BUSINESS . . .**
- **ADVERTISE IN WIRE AND WIRE PRODUCTS . . .**
- **SEND FOR ADVERTISING RATES TODAY . . .**

WIRE and WIRE PRODUCTS

453 MAIN STREET **STAMFORD, CONN.**

Automation Makes Better Wire

In the manufacture of heater wire, before the advent of automatic coating thickness control, the process depended on the diligence and skill of the operators. They checked with a hand micrometer and adjusted the coating process manually. Diameter variations ran high, often as much as ten times as great as with the automatic control, which gauges the wire and adjusts the coating process automatically through a gauge signal. The result is wire of uniform diameter.

★ ★ ★

This automatic gauging of heater wire coating thicknesses can be accomplished with the Microlimit Controls made by **Industrial Gauges Corp.,** 40 Grand Ave., Englewood, N. J. Gauging equipment also is made for the automatic and continuous gauging of other insulated wires and of bare rod and wire diameters. Microlimit Controls are useful wherever close tolerances must be maintained. Full particulars will be supplied upon request.

Anaconda Planning Extensive Expansion of Divisions

The American Brass Company's share in the proposed $400,000,000 expansion program of the Anaconda Company and its objectives to make the firm the strongest nonferrous metals company in the country, are being outlined to Company executives in all parts of the country and Canada by president **John A. Coe.**

★ ★ ★

The American Brass Company, wholly-owned subsidiary of Anaconda, will utilize 25% of the $400 million expansion program. Mr. Coe explained that half of the company's allotment would be used for expansion of present company facilities and the remaining half for the erection of new plants.

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50¢ for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,736,957, MANUFACTURE OF COPPER WIRE FOR VARNISH-INSULATED WIRES, patented March 6, 1956 by Harry Heering, Berlin-Spandau, Germany, assignor to Siemens-Schuckertwerke Aktiengesellschaft, Berlin-Siemensstadt, Germany, a corporation of Germany.

A method of producing enamel-insulated electric conductors, is disclosed which comprises smelting pure electrolyte copper in an oxygen-free environment, casting the copper in this environment into bars, subjecting the bars to heating to plastic condition, hot pressing in an extrusion press to form wire, drawing the wire to size, and coating the drawn wire surface with varnish.

★ ★ ★

No. 2,737,208, WIRE-WEAVING MACHINE, patented March 6, 1956 by Clair M. Harter, Seattle, Wash., assignor to Pacific Wire Works Co., Seattle, Wash., a corporation of Washington.

This machine provides spaced-apart eyes in the warp wires of a wire fencing, through which eyes are laced weft wire length, with the ends thereof projecting and then clinched with the outer warp wire. There are 27 claims.

★ ★ ★

No. 2,737,212, MACHINE FOR THE PRODUCTION OF CONVOLUTIONS IN WIRE, patented March 6, 1956 by Kalman Z. Huszar, Foster, Ohio.

There are 19 claims to this machine for producing serpentine-like bends in wire, with the bends being formed by screw members, each of which comprises a portion having a constant pitch and constant tooth height and an initial portion of a larger pitch and having a tooth height increasing from a minimum to a height merging with that of the first mentioned portion.

★ ★ ★

No. 2,737,483, METHOD FOR TIN PLATING BUNCHED AND BRAIDED WIRE, patented March 6, 1956 by Frederick A. Lowenheim, Plainfield, and Herbert E. Hirschland, Cranford, N. J., assignors to Metal & Thermit Corporation, New York, N. Y., a corporation of New Jersey.

The method is said to produce a tinned bunched or braided wire in flexible condition each of whose constituent strands are plated with tin and separated from adjacently lying strands. After the wire is initially tinned, it is rinsed and dried and heated under non-oxidizing conditions to reflow the tin plate.

★ ★ ★

No. 2,737,679, LEATHER BURNISHING AND POLISHING DEVICE, patented March 13, 1956 by Daniel Choma, East St. Louis, Ill.

A flexible tubular member of light wire mesh material comprises the major portion of this device. The wire mesh consists of interwoven strands angularly arranged along the tubular axis at an acute angle with respect to this axis.

★ ★ ★

No. 2,738,136, COIL WINDING APPARATUS, patented March 13, 1956 by Kenly C. Bugg, Fort Wayne, Ind., assignor, by mesne assignments, to Kendick Manufacturing Company, Inc., Fort Wayne, Ind., a corporation of Indiana.

An internally slotted stator frame and coil winding apparatus is disclosed, including a chain carrying member located in the internally slotted stator frame, a continuous chain carried by the chain carrying member and extending around this member and means for driving the chain around the chain carrying member with opposite runs of the chain moving within the stator frame in opposite directions. There are twenty-one claims.

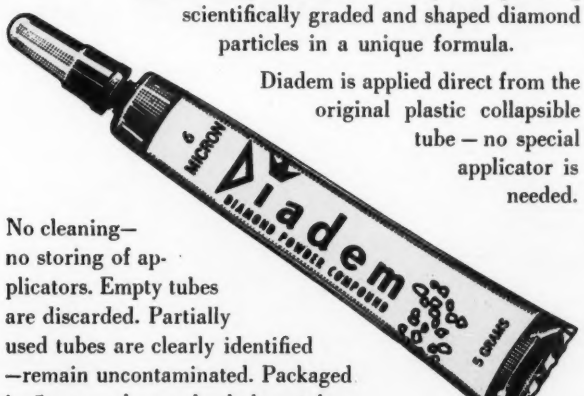
★ ★ ★

No. 2,738,289, HOT DIP ALUMINUM COATING PROCESS, patented March 13, 1956 by Webster Hodge, Columbus, Ohio, assignor, by mesne assignments, to

Diadem | DIAMOND POWDER COMPOUND

Diadem Compounds are made by incorporating scientifically graded and shaped diamond particles in a unique formula.

Diadem is applied direct from the original plastic collapsible tube — no special applicator is needed.



Approximate size

No cleaning— no storing of applicators. Empty tubes are discarded. Partially used tubes are clearly identified —remain uncontaminated. Packaged in 5 gram clear polyethylene tubes. Close-graded micron sizes—clearly colored for easy recognition. Further information about DIADEM upon request.

WHITTAKER CLARK & DANIELS, INC.

260 West Broadway
New York 13, N. Y.

Surface Combustion Corporation, Toledo, Ohio, a corporation of Ohio.

In a process of providing a ferrous metal with a hot-dip coating consisting essentially of aluminum, the steps include preparing the cleaned surface of the ferrous metal to receive such coating, by providing on such surface a coating of an aqueous solution of an alkaline salt of an oxyacid of phosphorus with an alkali metal, having a concentration from .05 to 2 per cent.

★ ★ ★

No. 2,738,811, METHOD FOR TYING WIRE KNOTS, patented March 20, 1956 by Albert R. J. Luke, Toronto, Ontario, Canada, assignor to Massey-Harris-Ferguson, Inc.

A method of tying a wire knot is disclosed including, twisting a pair of wires together about one axis at two spaced points along their length thus forming twisted portions and maintaining them between these portions separate from each other, each portion having two pairs of legs extending therefrom and maintained in spaced-apart relationship, twisting the twisted portions and the legs of each pair about axes substantially at right angles to the first axis thereby forming two complete knots, and severing the wires between the knots.

★ ★ ★

No. 2,739,332, ROTARY WIRE BRUSHES, patented March 27, 1956 by Alfred J. Flohr, Kenmore, N. Y., assignor of two-fifths to John C. Ward, Buffalo, N. Y.

The brush includes an annular series of wire bristles arranged within the channel of a disc-like rubber carrier.

★ ★ ★

No. 2,739,371, METHOD FOR PRODUCING CONDUCTING COILS, patented March 27, 1956 by Richard O. Grisdale, Short Hills, N. J., and Harold A. Sauer, Warminster, Pa., assignors to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York.

This method comprises coating a bare conductor with a fluid thermosetting resin having finely divided solid insulating particles dispersed therein, solidifying the resin of the coating to a degree sufficient to maintain the particles on the conductor yet insufficient to maintain a separation between turns of the wound conductor, then winding the conductor into a coil, maintaining a separation between the adjacent turns of the wound conductor by the solid particles in the coating, then coalescing the resinous material of the coating of adjacent turns of the conductor, and solidifying the coalesced coatings.

★ ★ ★

No. 2,739,528, WIRE MARKING APPARATUS, patented March 27, 1956 by James Lowe, Santa Ana, Calif., assignor to Anaconda Wire and Cable Company, a corporation of Delaware.

Apparatus is disclosed for printing legends on the surface of a soft freshly applied insulation on a moving wire on which the insulation shortly becomes relatively hard and nondeformable.

★ ★ ★

No. 2,739,623, WIRE TWISTING DEVICE, patented March 27, 1956 by John H. Wirt, Los Angeles, Calif.

More specifically the device is for twisting together a number of strands of wire.

"Fun With Wire"

An interesting new book "Fun With Wire" has just been published by **J. B. Lippincott Co.,** East Washington Square, Philadelphia, Pa., illustrating and describing many items that can be made of wire as a hobby. The book sells for $3.00.

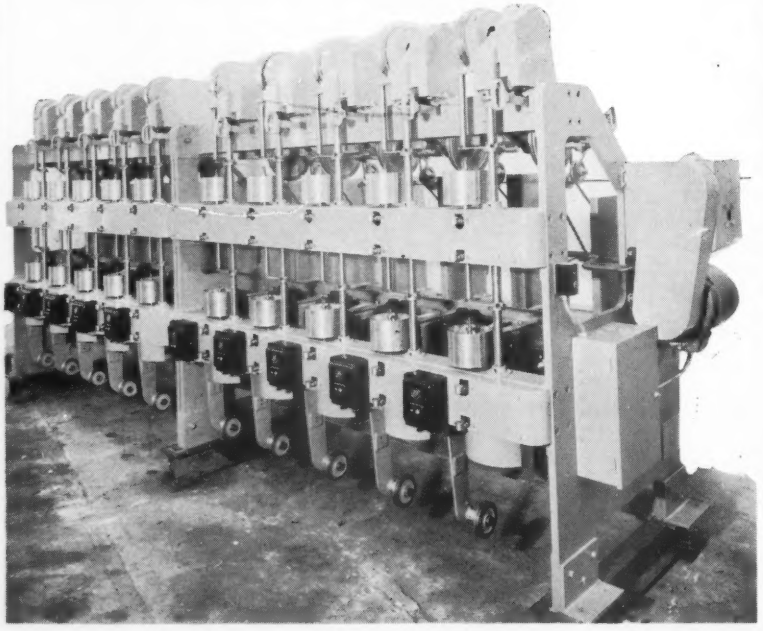
★ ★ ★

A great variety of objects, from flowerpots to jewelry, can be made with wire. The text describes the kinds of wire suited to different items and shows clearly the methods that may be used in their forming. Instructions are detailed and easy to follow.

★ ★ ★

The author is Joseph Leeming, who previously wrote "Fun With Pencil and Paper" and "Fun With Beads".

2D-10-MBB INSULATION WINDING MACHINE No. 1129



APPLIES DOUBLE COVER TO 10 LINES OF WIRE SIMULTANEOUSLY. NOMINAL WIRE RANGE #15 TO #25 B&S GAUGE (.057″ TO .018″ or 1.450MM TO .455MM). STANDARD CAPSTANS 8″ DIAMETER. SUPPLY WIRE LETOFFS AND TAKE-UPS ARE AT REAR OF MACHINE NOT SHOWN. MACHINE CAN BE ARRANGED SPECIAL WITH 12″ DIAMETER CAPSTANS FOR HEAVIER WIRES.

EST. 1855 AIMCO INC. 1915

"American" INSULATING MACHINERY COMPANY

REG. U.S. PAT. OFF.

FAIRHILL AND HUNTINGDON STREETS

PHILADELPHIA 33 PENNSYLVANIA U.S.A.

AMERICAN IRON AND STEEL INSTITUTE

350 FIFTH AVENUE, NEW YORK 1, N. Y.

AIS 10

Total Number of Companies Included 131

FEBRUARY - 1956
Month

SHIPMENTS OF STEEL PRODUCTS
ALL GRADES INCLUDING CARBON, ALLOY AND STAINLESS
(Net Tons)

Covering Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or for Resale)

Steel Products	Items	Current Month 1956 Carbon	Alloy	Stainless	Total	Percent of Total Shipments	Prior Year (1955) Percent of Total Shipments	Year to Date 1956 Carbon	Alloy	Stainless	Total	Percent of Total Shipments	Prior Year (1955) Percent of Total Shipments
Ingots and Steel Castings	1A	63,185	14,579	2,002	79,766	1.1	0.5	114,193	30,256	4,165	148,614	1.0	0.5
Blooms, slabs, billets, sheet bars	1B	171,039	51,058	2,255	224,352	3.0	3.6	343,134	105,305	4,518	452,957	3.0	3.3
Tube rounds	1C	2,962	339	32	3,333	-	-	2,949	668	32	3,649	-	-
Skelp	2	12,194	-	-	12,194	0.2	0.2	26,207	-	-	26,207	0.2	0.1
Wire rods	3	93,604	2,130	416	96,150	1.3	1.5	* 194,820	4,464	805	* 200,089	1.3	1.4
Total Semi-Finished		342,984	68,106	4,705	415,795	5.6	5.8	* 681,303	140,693	9,520	* 831,516	5.5	5.3
Bars—Hot rolled (incl. light shapes)	14	614,842	189,134	4,897	808,873	10.8	10.3	* 1,217,393	399,587	9,484	* 1,626,464	10.8	10.4
Bars—Reinforcing	15	174,133	-	-	174,133	2.3	2.1	356,039	-	-	356,039	2.4	2.0
Bars—Cold finished	16	136,307	29,786	5,018	171,111	2.3	2.2	278,434	60,404	10,321	349,159	2.3	2.2
Tool steel	17	1,464	9,149	-	10,613	0.2	0.1	3,031	18,695	-	21,726	0.1	0.1
Total Bars and Tool Steel		926,746	228,069	9,915	1,164,730	15.6	14.7	* 1,854,897	478,686	19,805	* 2,353,388	15.6	14.7
Wire—Drawn	23	265,122	4,636	2,965	272,723	3.7	3.6	525,486	9,082	6,184	540,752	3.6	3.6
Wire—Nails & staples	24	48,597	-	-	48,597	0.7	0.8	98,688	-	-	98,688	0.7	0.8
Wire—Barbed & twisted	25	9,923	-	-	9,923	0.1	0.2	17,071	-	-	17,071	0.1	0.2
Wire—Woven wire fence	26	29,468	-	-	29,468	0.4	0.6	54,424	-	-	54,424	0.4	0.5
Wire—Bale ties	27	3,302	-	-	3,302	-	0.1	6,353	-	-	6,353	-	0.1
Total Wire & Wire Products		356,412	4,636	2,965	364,013	4.9	5.3	702,022	9,082	6,184	717,288	4.8	5.2
Black plate	28	70,914	-	-	70,914	1.0	0.9	142,006	-	-	142,006	0.9	1.0
Tin & terne plate—hot dipped	29	77,877	-	-	77,877	1.0	1.5	158,911	-	-	158,911	1.1	1.4
Tin plate—Electrolytic	30	404,193	-	-	404,193	5.4	5.6	806,820	-	-	806,820	5.4	5.6
Total Tin Mill Products		552,984	-	-	552,984	7.4	8.0	1,107,737	-	-	1,107,737	7.4	8.0
Sheets—Hot rolled	31	754,231	43,584	2,518	800,333	10.7	12.0	1,556,117	83,794	4,379	1,644,290	10.9	12.1
Sheets—Cold rolled	32	1,250,947	7,128	13,081	1,271,156	17.0	18.9	2,541,262	13,694	25,870	2,580,826	17.1	19.4
Sheets—Galvanized	33	272,997	-	-	272,997	3.7	3.3	542,461	-	-	542,461	3.6	3.4
Sheets—All other coated	34	22,882	-	-	22,882	0.3	0.3	47,457	-	-	47,457	0.3	0.3
Sheets—Enameling	35	Not Available.		Included	In Cold Rolled Sheets.								
Electrical sheets & strip	36	9,923	60,111	-	70,034	0.9	1.0	21,762	120,172	-	141,934	1.0	1.0
Strip—Hot rolled	37	177,737	3,148	464	181,349	2.4	2.6	343,243	6,385	778	350,406	2.3	2.6
Strip—Cold rolled	38	135,639	1,577	21,073	158,289	2.1	2.1	276,840	3,035	45,178	325,053	2.2	2.2
Total Sheets and Strip		2,624,356	115,548	37,136	2,777,040	37.1	40.2	5,329,142	227,080	76,205	5,632,427	37.4	41.0
Total Shipments (1956)		6,881,078	528,114	59,201	7,468,393	100.0	xxx	*13,851,099	1,084,083	120,347	*15,055,529	100.0	xxx
Total — Prior Year (1955)		5,677,138	393,932	48,830	6,119,900	xxx	100.0	11,235,769	796,749	96,945	12,129,463	xxx	100.0

* REVISED

CAMDEN WIRE CO., INC.

Wire Fabricators

Producers of Quality Fine Wire Copper Conductors

EXTRA FLEXIBLE CONDUCTOR STRANDED OR BRAIDED

MULTIPLE ENDS OF SIZES .008 to .002

BARE • TIN or LEAD COATED • SILVER PLATED

Special Heavy Tinned Conductors for Hook-up Wire

40 MASONIC AVENUE • CAMDEN, NEW YORK

COPPER - Refined copper produced at primary plants in the United States, 1954-55 (monthly averages) and 1956, by months, in short tons

	From primary material			From scrap		
	Domestic	Foreign	Total	New	Old	Total
1954	70,143	30,850	100,993	8,518	6,477	14,995
1955	83,125	28,747	111,872	10,680	6,533	17,213
1956:						
January	93,252	24,379	117,631	6,360	6,466	12,826

Consumption of refined copper in the United States, in 1955 and January 1956, in short tons

	Wire mills 1/	Brass mills 2/	Chemical plants	Secondary copper smelters	Foundries and miscellaneous	Total
January 1956:						
Catnodes	1,086	8,741	(3)	55	(3)	9,882
Wire bars	74,951	6,995	(3)	-----	(3)	81,946
Ingots and ingot bars	1,256	14,540	(3)	92	(3)	15,888
Cakes and slabs	------	19,508	(3)	2	(3)	19,510
Billets	------	15,735	(3)	-----	(3)	15,735
Other	------	------	(3)	48	(3)	48
Total	77,293	65,519	(4)	197	(4)	4/146,009

1/ Includes all wire mills with rod-rolling facilities. 2/ Includes all brass mills using copper in refinery shapes; some have rod-rolling facilities. 3/ Not available. 4/ Consumption by chemical plants, foundries, and miscellaneous plants not included.

NIEHAUS

WIRE STRANDING
ROPE CLOSING
CABLE MAKING

MACHINES

Cabling machines for steel, copper and aluminum wires, rubber and telephone strands

MASCHINENFABRIK K. A. NIEHAUS • • GERMANY
DÜSSELDORF-RATH

ASTM Sets Sights on Nuclear Problems

Standards for materials and for testing of materials used in nuclear energy development, particularly in the construction of reactors, will receive special attention by the **American Society for Testing Materials.** A Special Administrative Committee on Nuclear Problems has been organized by the Society. Its scope is (1) to advise the technical committees of the Society on nuclear problems pertinent to their respective scopes, (2) to stimulate the undertaking of research and standardization projects, specifically related to nuclear energy, on the part of the technical committees, and (3) to review periodically the status of the work.

★ ★ ★

As a first step in coordination, ASTM Committee E-10 on Radioactive Isotopes will be asked to expand its title and scope to investigate, promote, and advise on techniques and standards for measuring changes in properties and constitution of materials as a function of radiation exposure. The Special Administrative Committee agreed that basic procedures for specimen preparation, exposure to radiation, and special techniques for measuring properties after exposure could be developed by Committee E-10.

★ ★ ★

The Atomic Industrial Forum and ASTM will sponsor jointly a symposium on radiation effects on materials at the ASTM Pacific Area National Meeting in Los Angeles, September 17-21, 1956. Additional papers sponsored by Committee E-10 concerning radiation effects and radioisotope uses will be included in a companion symposium.

New Specifications for Plastic Coated Wire Rope

Just released are new specifications and information regarding proper use of Plastic Coated Wire Rope. Circular is No. 5610 available from **Macwhyte Company,** Wire Rope Manufacturers, Kenosha, Wisconsin.

★ ★ ★

Plastic Coated Wire Ropes having strengths from 480 to 7000 pounds, weighing from 13 to 153 pounds per 1000 feet, are shown. Minimum safety factors, sheave and drum diameters, and tread pressure formulas are also included.

★ ★ ★

Circular No. 5610 is available free by card or letter to distributors or to Macwhyte Company, Kenosha, Wisconsin.

Indexing Turntables Catalog

The most complete Indexing Turntable Catalog of its kind has been released by the **Eisler Engineering Co., Inc.,** 750 So. 13th St., Newark 5, N. J.

★ ★ ★

It shows approximately 150 Indexing Turntables, Rotating Turntables and tables that can be set at practically any desired angle—just

If you are still using costly diamond dust for refinishing your wire drawing dies, you'll be amazed at the savings you can make by switching to NORBIDE Abrasive. Wire mills everywhere have found that this abrasive — the hardest manufactured abrasive commercially available — is ideal for ripping and semi-finishing operations.

Many of our customers order NORBIDE Grain in 100 lb. drums. Many others order and re-order ¼ lb. and ½ lb. cans. No matter what your requirements are we can fill your order promptly from stock.

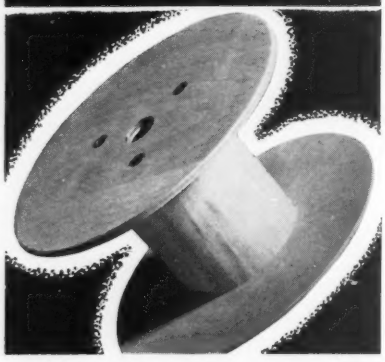
For details and prices on this cost-cutting abrasive write for Form 559.

NORTON BORON CARBIDE

NORTON COMPANY
45 New Bond St. • Worcester 6, Mass.

NORBIDE® *The hardest manufactured abrasive commercially available!*

PROVEN BY THEIR RECORD



Leading manufacturers all over the country choose Carris reels and continue to do so, due to their record. They're all plywood, light and strong, and moisture resistant. Custom-built to your particular requirements, they're produced by straight-line methods, assuring economical costs and quick delivery. Let us quote on your requirements. Write us today!

SAY "CARRIS" BECAUSE

- √ THEY'RE ALL PLYWOOD
- √ THEY'RE QUALITY-CONTROLLED
- √ THEY'RE MADE BY VERMONT CRAFTSMEN
- √ THEY'RE DEPENDABLE & ECONOMICAL
- √ THEY'RE STRONG AS VERMONT'S GRANITE HILLS

CARRIS

RETURNABLE ■ NON-RETURNABLE

PLYWOOD REELS AND SPOOLS

70 PARK ST. RUTLAND, VT.

Tel. PRospect 3-7388

a few of the hundreds of different types of turntables the company manufactures.

★ ★ ★

The Catalog will be sent upon request. Ask for Nos. 88-66 and 88-56-C.

★ ★ ★

The company also specializes in the manufacture of Geneva Gears, Barrel Cams and special gear arrangements.

Article on Stainless Steel Hardening

The "Surface," 8-page house organ features application story on bright hardening of stainless steel.

★ ★ ★

The issue contains also an interesting article describing how eight different heat treat problems were solved successfully.

★ ★ ★

Write for Heat Treat Review, Vol. 6, No. 3, **Surface Combustion Corporation,** Toledo 1, Ohio.

★ ★ ★

New Fiberglas Folder Available

Fiberglas-base insulation materials are now competitive in cost with many organic Class A insulation materials, according to a six-page folder recently published by **Owens-Corning Fiberglas Corporation,** supplier of glass yarns. This means, the company says, that such materials can now provide motors with Class B performance at Class A costs.

★ ★ ★

The folder contains descriptions of the high thermal endurance, reduced space factor, high moisture resistance and other properties of Fiberglas tapes, braids, and cloth. It also presents information comparing the properties of Fiberglas-base materials with those using other kinds of textile bases.

★ ★ ★

Copies of the folder may be obtained by writing Owens-Corning Fiberglas Corporation, Electrical Division, 598 Madison Avenue, New York 22, New York.

FOR EXTRA TONNAGE

FROM YOUR BAR STOCK AND WIRE DIES

COAT WITH BORAX 5 MOL.

Borax and Borax 5 Mol Offer Many Advantages as a Coating Material

Here is dust-free, granular material that is readily soluble in water and dries quickly. The residual film is tight yet pliable... won't flake off! Borax is safe to use, easy to handle, and non-irritating to the skin. You can feed stock faster and you get longer, more accurate performance from your dies.

Check these advantages of borax-coated stock:

- COMPATIBLE WITH DRAWING LUBRICANT
- BETTER WORKING CONDITIONS
- FASTER BUTT WELDING
- LONGER DIE LIFE
- LONGER STORAGE SAFETY
- CLEANER TO HANDLE IN TRANSIT

Write for Technical Data Sheet #2 WD

PACIFIC COAST BORAX CO.

DIVISION OF BORAX CONSOLIDATED, LIMITED

NEW YORK • CHICAGO

LOS ANGELES • CLEVELAND

PHILADELPHIA

MANUFACTURERS OF FAMOUS "20 MULE TEAM" PACKAGE PRODUCTS

Booklet on Galvanizing Control

The Promat Division of **Poor and Company,** 851 So. Market St., Waukeegan, Ill., has issued a new folder entitled "For Controlled Protection", in which is described the company's process for preparing metal surfaces for galvanizing, to assure a superior galvanized coating.

★ ★ ★

The process includes scale removal and fluxing and is said to give longer acid life, controlled dross formation and improved product appearance.

★ ★ ★

The booklet will be sent upon request.

Literature Announced on PIP Push Insert

A new, four-page bulletin (No. 731) has been announced by the **Heli-Coil Corporation,** Danbury, Conn., illustrating and describing the PIP push insert—newest addition to the Heli-Coil line of screw thread inserts. The PIP push insert provides female threads in molded plastics, laminates, die-cast alloys, powdered metals and light metals in a drilled or cored hole without tapping, at low cost in large quantities. The insert is pushed into the hole and is not wound or turned. The new bulletin gives size ranges available, installation techniques and an application chart.

Develops Process for Pointing Wire

Robert A. Main and Sons, Inc., 257 Pascack Road, Paramus, N. J., has developed a new process for pointing wires and wire products that is much more economical than most types of wire pointing available on the market today. Such wire pointing can be done on large and small diameters on straight forms. Secondary operations of spending the butt end, flattening the butt end or folding the butt end can be accomplished. Large quantity production is more favorable to this type of pointing. In addition to working with a carbon steel, stainless monel and brass can be processed also.

To Increase Zirconium Production Facilities

Firth Sterling, Inc., announces that it is proceeding immediately to substantially increase its capacity for vacuum melting of reactor grade zirconium sponge by installing at its Trafford plant a consumable electrode furnace, melting under argon-helium gas or vacuum. The new facility will more than double present capacity and will produce up to 2000 lb. zirconium ingots.

★ ★ ★

Kenneth D. Mann, Firth Sterling President, stated that the available supply of sponge is inadequate to meet the rapidly increasing demand for this remarkable metal, which will be available at much lower prices and in greater volume by the middle of 1957. Firth Sterling's new capacity for melting will pace the increasing output of sponge as facilities for its production are completed during the next year.

★ ★ ★

The company offers a complete range of rolled and drawn products in both reactor and commercial grade zirconium including bar, sheet, strip, wire, and tubing.

Wires for Electrical Conductors

After some three years of effort by Committee B-1 members and special industry advisers, the committee at its January 13, 1956 meeting accepted for letter ballot the establishment of statistical sampling procedures in ASTM Specifications B 33 and B 189. These specifications cover, respectively, tinned soft or annealed copper wire, and lead-coated and lead-alloy-coated soft copper wire, both for electrical purposes. Just five years ago, Committee B-1 on Copper Wire established the first statistical sampling procedure in an ASTM specification (Specification B 1 for Hard-Drawn Copper Wire). In 1953, Specifications B 3 for Soft or Annealed Copper Wire were revised to include the statistical basis for sampling.

★ ★ ★

Tentative Specifications for Silver-Coated Soft or Annealed Cop-

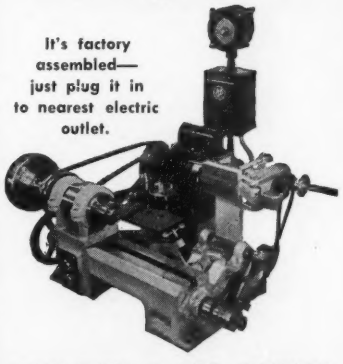
START SAVING in your Die Finishing Rooms

Double your Refinished Tungsten Carbide Die Production

CUT labor costs ½ with the New type "M" automatic

DYKREX
"IT CORRECTS THE DIE"

Polishing Machine

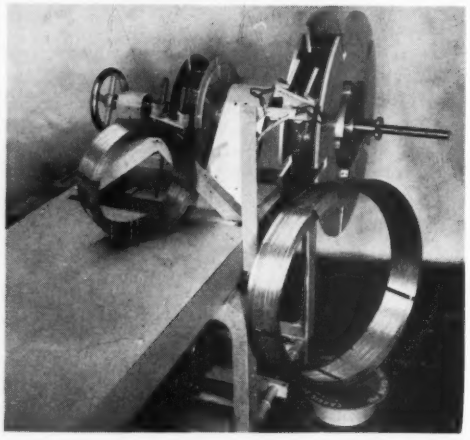


ROOS TOOL & MFG. DIVISION
Dykrex Corporation of America
manufacturers of
Wire Die Finishing Machinery
33 Bloomfield Avenue
Newark 4, N. J.
Western Union
Teletype Service
QAB-WUX—Montclair, N. J.

The Standard of the Wire Industry

NEW . . .

THE BOYD MICRO-SPOOLER & COILER



The Boyd MICRO-SPOOLER has been an astounding success in perfect level layer winding of Aluminum, Bronze Stainless Steel and all other types of welding wire on disposable spools. With adaptors it can now wind the same wire in self contained coils in perfect level layer wind as on the spools.

Send us a sample of your welding wire in sizes down to 1/32". We will wind it on your spools or ours. Better still have your engineers visit our plant and see a demonstration.

BOYD & SONS MANUFACTURING COMPANY

1434-38 Callowhill Street Philadelphia 30, Penna.

MACHINES FOR COPPER • STEEL • BRONZE ALUMINUM • ALLOY WIRES

SPECIALIZED EXPERIENCE

TWISTING • STRANDING BUNCHING

CONTINUOUS TENSION CONTROL FOR PRECISION-QUALITY

HASKELL-DAWES MACHINE COMPANY

HASKELL-DAWES MACHINE COMPANY

2231 E. ONTARIO STREET, PHILADELPHIA 34, PENNA.

per Wire, (B 298) first published in 1955, are under consideration for revision in 1956. This product has become increasingly important in high-temperature applications.

★ ★ ★

Two new classes will be added, including wires whose silver coating amounts to 2½ and 6.1 per cent of the total weight. Also, since bare spots are likely to occur when the silver coating is under 40 micro-inches in thickness, wire sizes in this category will not be listed, but a statement will be included that such sizes can be purchased if desired. In the sodium polysulfide test for determining continuity of coating, a 15-sec dip in an HCI solution will be required in order to remove silver sulfide before the specimen is examined for copper sulfide.

★ ★ ★

ASTM Specifications for ACSR Conductors (aluminum conductors, steel reinforced) (B 232) will be revised to permit steel core wire with galvanized coatings heavier than standard weight to be used. Also to be added is a second class of conductors for weather-resistant use having a lay not less than 8 nor more than 16 times the outside diameter of the conductor.

Pigment Manufacturer Moves Offices

The executive offices of **Acheson Dispersed Pigments Co.**, a unit of **Acheson Industries, Inc.**, have moved to the Morris Building, Philadelphia 2, Pa., in January, according to **J. S. Thome**, vice president and general manager. The purchasing and general office staffs will remain at the former address and orders will continue to be processed from that point.

★ ★ ★

The move to a more convenient location in Philadelphia coincides with a need for more processing space at the Acheson plant. With Mr. Thome in the new offices are **E. T. Butler**, sales manager; **H. A. Acheson, Jr.**, assistant to the general manager; and **E. L. Florence**, staff engineer.

Bulletins on Adjustable Speed Drives

The Louis Allis Co., Milwaukee 7, Wis., has issued two new bulletins, Nos. 611-E and 1100-B, describing two types of drives that are particularly suited to wire industry requirements.

★ ★ ★

No. 611-E covers their alternating current adjustable speed drive, called "Adjusto Spede" and No. 1100-B their speed drive for A. C. power embodying the new magnetic amplifier control. This model is called "Select-A-Speed".

★ ★ ★

Complete details, fully illustrated with photographs and plan drawings, are given in each bulletin, which are available upon request.

★ ★ ★

Besides the speed drives, Louis Allis manufactures a complete line of motors of advanced design for all industrial uses.

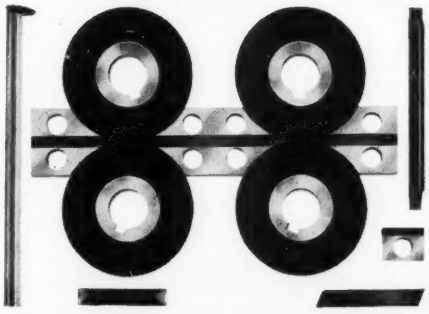
Now Corona Tests May Be Repeated Frequently Without Insulation Breakdown

A self-contained and non-destructive unit which enables simple and accurate Corona testing for research, development or production requirements is now available from **Peschel Electronics, Inc.,** 15 Garden Street, New Rochelle, New York.

★ ★ ★

The new, improved Corona Test Set includes all the necessary circuit refinements and controls to permit a continuous and adjustable output. An overload relay protects the specimen and the power unit in the event of a short circuit. Accurate voltage indication is provided for with a triple range Kilovoltmeter at the output terminals. Special sweep circuits provide a straight line oscilloscope trace with recurring Corona pulses occupying the center of the trace. The presence of noise will not detract from the clear presentation of these pulses. The set can be equipped with a motorized output control to enable the gradual application of test voltage at uniform rates of 500 or 1000 volts per second.

CRAFTS ... for LONGER LIFE



Spring coiling machine tools made of tungsten carbide will outlast steel — but unless the grooves FIT your wire ALL AROUND — you are *not* getting *maximum* life.

CRAFTS Carbide Tools are optically ground in special equipment of exclusive design. Grooves are *guaranteed* round and to size . . . to give *complete* support and uniform wear for longest life.

Depend on **CRAFTS** Tools for better springs . . . a quality name since 1928.

MAIL COUPON TODAY

for Complete Information and Price List on the CRAFTS *line*

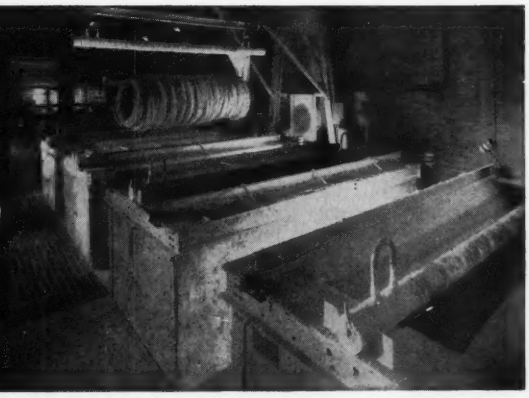
Arthur A. CRAFTS Company
601 Newbury Street
Boston, Mass.
CHICAGO DETROIT PHILADELPHIA BRISTOL, CONN.

Arthur A. CRAFTS Company, Inc.
601 Newbury Street, Boston, Mass.

Gentlemen:
Please send me complete information and Price List on CRAFTS Tools.

Name_____
Firm_____
Address_____

carl mayer
HI-SPEED REGISTERED
ROD BAKERS



Faster baking, greater fuel economy, maximum production efficiency are just a few of the results of the exclusive heating arrangement of the Carl Mayer Hi-Speed Rod Baker. It also has a patented blow-off feature which removes moisture without damage to coils.

Here are just a few of our many satisfied customers:

American Steel & Wire Co.
Atlas Steel Co.
Colorado Fuel & Iron Corp.
Crucible Steel Co. of America
B. Greening Wire Co., Ltd.
Indiana Steel & Wire Co.
Jones & Laughlin Steel Corp.
Republic Steel Corp.

Write for Bulletin No. 350

Patent Nos.
U. S. A. 2,296,361 2,323,828 2,235,559
Canada 396,144 401,589

THE carl mayer CORP.
3030 EUCLID AVE., CLEVELAND 15, OHIO

OTHER PRODUCTS: Core Ovens • Mold Ovens • Welding Rod Ovens • Heat Treating Ovens & Furnaces • Special Processing Equipment and Accessories.

NEW DATA SHEET TELLS HOW

WEBB BLUE LABEL Stainless Wire

GIVES YOU:

- BETTER COILING
- IMPROVED BENDABILITY
- MORE CORROSION RESISTANCE
- LONGER FATIGUE LIFE
- LOWER COST

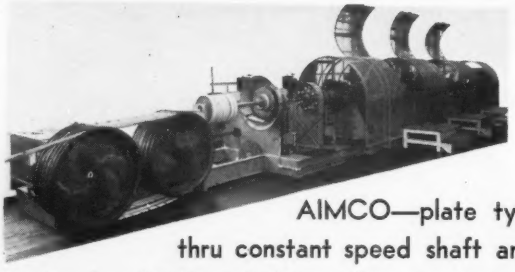
IF YOU USE TYPE 302 STAINLESS WIRE . . . it will pay you to investigate this latest WEBB development—an improved analysis for production of springs and other products.

New Data Sheet gives you complete information on analysis, sizes, availability. Take the first step toward improving your products and reducing your production costs. Send for your copy of this new Data Sheet on Blue Label Wire.

Write today!

The Carpenter Steel Company
WEBB WIRE DIVISION
New Brunswick, New Jersey

4-WIRE TWISTING MACHINES



CABLE REELS 48" DIA.-31" O. A. WIDTH.

FILLERHEAD 24 PACKAGES 12" DIA., 12" TRAVERSE.

AIMCO—plate type serving head driven thru constant speed shaft and variable speed drive. Taping head 24" pad driven thru constant speed shaft and variable speed drive.

Capstans double 6 groove 42" root diameter. Rates of lay from 3" to 50". Flyer speed 8 steps from 600 to 34 R.P.M. Handles large diameter wires on cradle reels.

An exceedingly efficient and versatile machine.

THE EDMANDS CO. 860 WELLINGTON AVE., CRANSTON 10, R. I.

Inspection Method for Discovering Hair-Cracks

A testing method, called by its German inventor "Met-L-Chek," somewhat similar to that using magnetized iron powder, is simple, quick and sure. Two solutions are used. The piece is first brushed with a red dye liquid. Within five to ten minutes the color penetrates into the finest hair cracks. Then the surface is washed off with tap-water, the color remaining in the hair cracks. The surface is then dried with a hot air blast, after which it is painted or sprayed with a white liquid called a developer. This liquid extracts the red out of the cracks so that spots and streaks of red mark the position, form and size of the cracks upon the white surface, the intensity of the red color on the white field revealing the breadth and depth of the hair cracks. Photographs are easily made if desired.

★ ★ ★

After this investigation the part can be cleaned easily by rubbing or brushing. For the success of this method it is essential that the part be first absolutely cleaned from any previously applied cleaning agent. Pieces that are to receive a color coating after this testing may need a further treatment, as in some circumstances the red color will bleed through the applied color. In such cases it is best to rub the piece with petroleum and finally, after a proper interval, to dust with powdered lime. The surface can now be safely coated. This process has been used successfully for pre-selection of material, in the finish inspection and in any subsequent inspection of important parts made of any metal.

(From Draht-Welt, Nov. 10, 1955.)

New Catalog on Crane Electrification

Catalog No. 2021-A, just off the press, is offered by **The Cleveland Crane & Engineering Co.**, Wickliffe, Ohio, on their line of Inverted-Y Electrification, which is now being made available for the first time for application on all makes of cranes and runways. The free booklet contains drawings and all cat-

alog information necessary for ordering the aluminum Inverted-Y Conductors, supports, and collectors for any normal application requiring current in amounts of 300 to 1000 amperes.

Free Running Locknut Announced by Jacobson

Harvey Jacobson, president of the **Jacobson Nut Mfg. Corp.,** announces an entirely new line of Locknuts.

★ ★ ★

These are 1-piece, free spinning and reusable. Automation of production from raw steel to finished product of these new Locknuts has resulted in a price comparable to common nuts.

★ ★ ★

The upper portion of the nut is slotted and the bottom face is undercut, so that when the nut is tightened, the threaded upper segments move inward causing the nut to produce a vibration-proof lock on the threads of the screw. Made of Steel, Brass, Aluminum and Stainless, they are available in all Machine Screw sizes.

★ ★ ★

For further information, engineering assistance and samples, inquiries should be addressed to the Jacobson Nut Mfg. Corp., Box 177, Kenilworth, New Jersey.

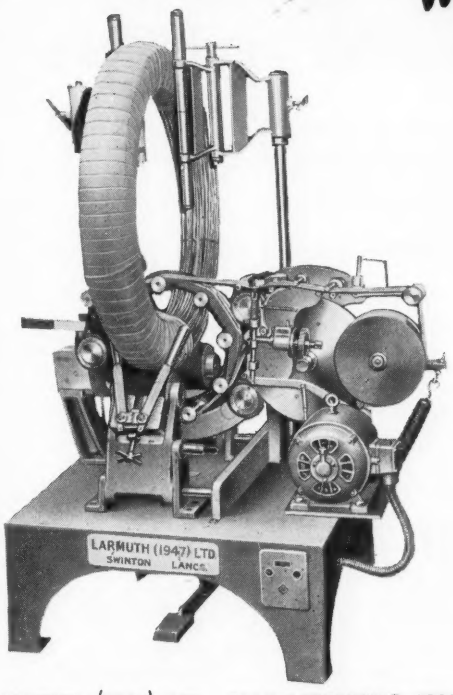
New Resin Catalog Available

A revised edition of the brochure "Petrothene (R) Polyethylene Resins" is now available from **U. S. Industrial Chemicals Co., Division of National Distillers Products Corp.,** 99 Park Avenue, New York 16, N. Y.

★ ★ ★

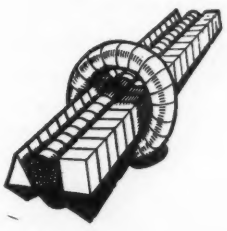
In addition to the information contained in the original edition—on general polyethylene properties, method of manufacture, uses, methods of processing and fabrication—the new brochure includes tables on: properties of the Petrothene 100 and 200 series resins; formulations of Petrothene 300 series electrical grade resins; typical electrical, thermal, chemical resistance and film permeability properties of polyethylene.

LARMUTH *Spiral Wrapping* MACHINES



are built to finest British engineering standards and are in use throughout the world for spiral wrapping of Motor Tyres, coils of Wire, Strip, etc., from 3" bore upwards. Also straight length Tubes, Bars, Rods, etc.

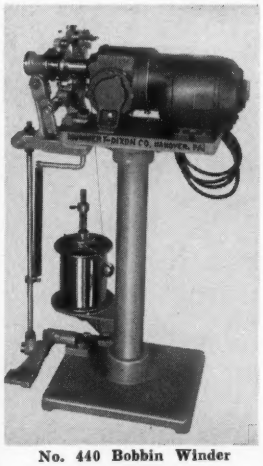
"BOUND" to get there safely.



LARMUTH *of England*

LARMUTH (1947) LTD., EAST LANCASHIRE ROAD, SWINTON, MANCHESTER, ENGLAND.
Telephone: Swinton 1015

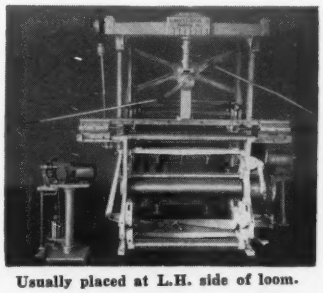
FAST SINGLE BOBBIN WINDER
No. 440 FOR USE WITH
M-D WIRE LOOMS


No. 440 Bobbin Winder

The winder shown at the left is designed to wind wire on bobbins as fast as the loom requires them. In fact, they will keep ahead of the loom's needs.

The winder is adjustable to bobbins of 3" or 4" in diameter and various widths of ½" to 1¼". Will wind a bobbin 3" diam. x 1" wide, of .011 wire in 8¼ minutes.

Traverse and wire guide are adjustable for any widths of movement desired. Will not pack wire so as to cause bobbin flange to bulge. The automatic stop is adjustable for any amount of fill required. The tail stock and other rollers have ball bearings.


Usually placed at L.H. side of loom.

The picture at the right shows the customary placement of the winder in juxtaposition with an M-D wire loom.

This small winder is carefully designed and made; needs only a minimum of attention.

Ask for descriptive circular No. 9953.

MUMMERT-DIXON CO., HANOVER 3, PENNA.

VINYLS for...

CRITICAL CUSTOMERS

For the past ten years we have specialized in the compounding of Vinyl extrusion and injection molding compounds to specifications, or developing compounds for a specific use.

Underwriters' approved standard compounds are available in all colors for POT, T, TW, 80 Degree C, 90 Degree C and 105 Degree C wires. We also have a compound which will meet requirements of Military Specifications MIL-W-5086.

If you require a Vinyl compound rated higher than 105 degrees C for special applications, we suggest you communicate with us, as we may have a compound to meet your requirements.

Your inquiries are invited.

ELECTRONIC RUBBER COMPANY

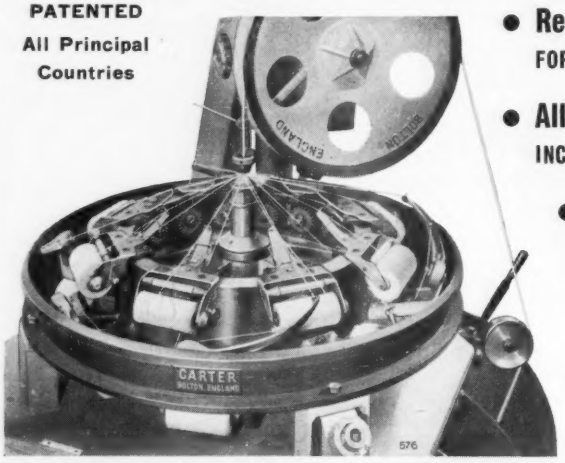
69 Sunnyside Ave. • Stamford, Conn.

B. & F. CARTER & CO., Ltd. BOLTON, ENGLAND

Telegrams "BRAIDERS BOLTON"

"Simplex" **ROTARY BRAIDER**

PATENTED
All Principal Countries



- **Higher Production for Yarn and Wire** (Single or Multi-Ends).
- **Greater Capacity.**
- **Reversible Action** FOR BETTER BRAIDS.
- **All Electric** INCLUDING "KNOCK-OFFS".
- **Suitable for Battery Installation** FOR CHEAPER COSTS AND OVERHEADS.

WRITE FOR SPECIFICATION

MAKERS OF PLANT FOR ELECTRIC CABLE • BRAIDING • WIRE • ROPE

Frost Steel & Wire Installs Loom for Welded Fabrics

One of the largest machines of its kind on the continent, a new loom for the production of welded reinforced wire mesh, has been installed by the **Frost Steel and Wire Company, Limited,** in Hamilton, Ontario.

★ ★ ★

The loom was installed at a cost of $300,000 and this, together with $260,000 spent on a new building, means another important process has been added to Hamilton industries' drive to supply the needs of the domestic construction market for reinforcing steel.

★ ★ ★

The loom is a huge machine. It is capable of producing mesh 12½ feet wide and its versatility is demonstrated by the fact that it can produce mesh in widths from two to 16 inches, in a great variety of gauges of wire.

★ ★ ★

Cold drawn wire is fed from a series of coils in the loom and the wire fabric is welded automatically into square or rectangular meshes. Powerful motors wind the finished product into compact coils for shipment.

Electric Wire Concern Expanding

The Plastic Wire and Cable Company of Jewett City, Conn., is erecting a new building to house its receiving and production departments. Measuring 274 feet in length with 20,000 square feet of available floor space, the new structure will hold equipment connected with the manufacturing, shipping and receiving of cable for telephone companies. The new building is located close to the company's present holdings.

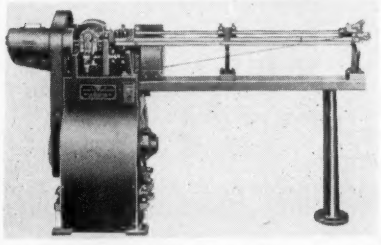
West German Wire Exports Decline

The West-German wire industry is reportedly worried about the drop in its export business from about 160,000 metric tons (or about 19% of total production) in 1954 to only a little over 115,000 tons (which is some 14% of production) in 1955.

The industry, which feels it cannot lower its export prices further without endangering remunerativeness, blames British and Netherlands competition — particularly in the field of special wire products —for this situation.

S & C Machine Improved

A roller type clutch and cut-off cam, now solenoid actuated, features the improved Shuster Model A Fine Wire Straightening and Cutting Machine. This new Model A constant speed machine, capacity .020"-.040", or .025-1/16" diameter basic wire, in providing an instantaneous "feather-touch" cutoff, insures exact accuracy of length of cut, and clean, even, swell-free wire



ends. Replacement of the former mechanical clutch and target also reduces operational supervision while increasing rate of production. The improved Model A machine fulfills a long-felt need for extreme accuracy of cut in the fine-wire field.

★ ★ ★

The Model A also features a 5-die straightening flyer, ball and roller bearing mounting of straightening flier, drive shaft, and fly wheel; V-Belt motor drive; and the lightning action cutoff knife.

★ ★ ★

For further details, write **Mettler Machine Tool, Inc.,** 155 West Adeline St., New Haven, Conn.

Diamond Die Firm Moves

Victor J. Boulin, Inc., has announced the removal of its business offices from New York City to 10 First Street, Pelham, N. Y. The company is an important supplier of diamond wire drawing dies and is headed by **Victor J. Boulin,** who has served American wire industry for a great many years. The new telephone number is PElham 8-0085.

UNION WIRE DIE CORP.

71 West 45th Street • New York 36, N. Y.

Main Plant: 375 Fairfield Ave., Stamford, Conn.

- DIAMOND DIES
- ROUND TUNGSTEN CARBIDE DIES
- SHAPE TUNGSTEN CARBIDE DIES
- HEADER DIES & MANDRELS
- CARBIDE SPECIALTIES
- DIAMOND POWDER
- UNILAP-TC DIAMOND COMPOUNDS
- INDUSTRIAL DIAMONDS
- DIAMOND RECLAMATION SERVICE
- DIE RECUTTING SERVICE
- DIE ROOM MACHINERY

• • • Serving the wire drawing industry for 35 years as the ONLY manufacturer of ALL products and services for the die room.

Sjogren **WEDGE GRIP**

Used by Wire Men Who Want the Best!

SJOGREN TOOL AND MACHINE CO., INC.

WIRE PULLERS • WEDGE GRIPS • JAWS FOR ALL MAKES OF PULLERS AND TESTING MACHINES • CAGE ROLLERS • SWAGING HAMMERS • POINTING DIES • WIRE SPOOLERS

14 SWORD STREET
AUBURN
MASSACHUSETTS

PROBLEMS OF SUPPLY?
HIGH QUALITY
WOVEN WIRE FABRICS
BRASS • COPPER • MONEL
STAINLESS STEEL • BRONZE
All Meshes and Weaves

AVIARY NETTING
STOCKS
and
DIRECT MILL SHIPMENTS

NEUWALZWERK
AKTIENGESELLSCHAFT
Bosperde 1/Westf. (West Germany)
Est. 1827

EXCLUSIVE IMPORTER FOR U. S.
JAMES S. BAKER (IMPORTS) CO. INC.
311 California St.
San Francisco 4, California

DIAMOND POWDERS

For the finest quality, accurately graded diamond powders—specify DANFORTH.

They will cost more than "bargain basement" powders, but will finish your dies more economically.

RECLAIMING
We will take your waste and reclaim it for you, guaranteeing that it will be 99% or better pure. Also, it will be returned properly graded for further use.

Get our prices and information on our processes.

C. W. DANFORTH CO.
Established in 1912
P.O. Box 448, Youngstown, O.

Spiral Multicolored PVC Jumper and Switchboard Wire

(*Continued from page 545*)

separated and lightfast. In addition, the shrinkage must not exceed 1 mm when a certain length of wire is submerged in a tin bath at 350°C for 15 seconds.

★ ★ ★

The following cables are presently being manufactured in Switzerland:

Distribution Wires:
Tinned wire 0.60 diameter, insulated wire 1.60-1.70 diameter.
Tinned wire 0.80 diameter, insulated wire 1.80-1.90 diameter.
9 wires of one color and 10 wires of two colors.
Switchboard Wire:
Tinned Wire 0.60 diameter, insulated wire 1.15-1.20 diameter.
Tinned Wire 0.80 diameter, insulated wire 1.35-1.40 diameter.
9 wires of one, 31 wires of two and 18 wires of three colors.
Cables G 51
2—40 pairs of switchboard wires 0.60 mm, in PVC sheath.
Cables Z 49
11—42 pairs of switchboard wire 0.60 mm, in PVC sheath.

★ ★ ★

If the wide application of varicolored PVC insulating wires in the field of overland telephone communication wires has been rapid, this is due to the fact that in addition to the advantages already quoted, a considerable time saving has been effected in making connections. Wire stripping is extremely rapid, most of the time by using cutting pliers, and the clear and durable colors facilitate identification. Assembly can be effected very quickly because the wire has a hard and smooth surface. Its abrasion resistance is about 100 times higher than that of wires previously used.

★ ★ ★

The new conductors, therefore, combine all the advantages inherent in plastic materials for insulation, and in textiles for identification.

ACKNOWLEDGMENT

The author wishes to thank Mr. L. J. Frisco, Assistant Research Contract Director, Dielectrics Laboratory, The Johns Hopkins University, Baltimore, Maryland, for having read the paper before the

FOR BETTER PRODUCTION

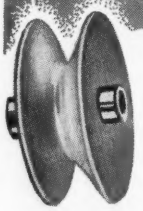
NATIONAL OFFERS YOU THREE SERVICES

- DIAMOND POWDER RECLAMATION — Exclusive process that gives maximum recovery. Send us your old cotton, die washings, worn wheels and sludge. High salvage percentages will pay you well.
- DIAMOND POWDERS—Complete line of graded quality powders for all lapping and finishing operations on wire drawing dies. First grades only.
- DIAMOND GRINDING WHEELS—A complete line of top-quality wheels for industrial production.

Write for prices.

NATIONAL RESEARCH COMPANY
25530 LITTLE MACK AVE.
ST. CLAIR SHORES, MICH.

Use HEANIUM®



the NEW material that withstands hi-speed pressure of wire by the tons

HEANIUM®
IS THE BEST GUIDE
. . . TO LOW COSTS.

If guide wear is a problem in your mill . . .
try HEANIUM®

HEANY INDUSTRIAL CERAMIC CORP.
NEW HAVEN 3, CONNECTICUT

QUALITY

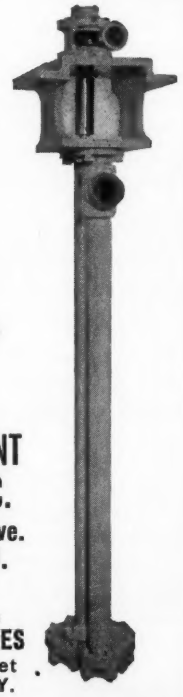
You'll find proof of this in every "CAREW" Cutting Nipper. Since 1863 every "CAREW" has been the product of superior materials and painstaking workmanship. Intrinsic QUALITY underlies the overall efficiency, operating ease, and production economies you get with every "CAREW" Cutter.

STOCKED BY YOUR LOCAL MILL SUPPLY DEALER.

M. W. ROBINSON CO., INC.
ROCKFALL, CONN.

WEMCO MOLTEN METAL PUMP

Air Driven for Rapid Transfer of
ZINC
LEAD
ALUMINUM
TIN
THEIR ALLOYS
and
HEAT TREATING SALTS



WIRE EQUIPMENT MFG. CO., INC.
1168 So. Olden Ave.
Trenton 10, N. J.

EXPORT AGENTS:
FISHER ASSOCIATES
122 E. 42nd Street
New York 17, N. Y.

Fourth Annual Symposium—Technical Progress in Communication Wires and Cables, December 6-8, 1955 in Asbury Park, N. J.

Protection Problems on Telephone Distribution Systems

(*Continued from page* 558)

the junction point. On the other hand, no protection is required at the junction of rural or urban wire and polyethylene insulated conductor cables as the dielectric strengths of the structures are of the same magnitude. When open-wire extensions or drop wire runs are connected to rural or urban wires, protection need only be installed at each junction point if the open wire or drops are highly exposed to lightning.

★ ★ ★

The dielectric strength of the plastics used on rural and urban wires is such that power contacts to new wires will not energize the conductors, at least not on the more common joint-use power voltages. It should be recognized, however, that physical damage to the insulating material associated with the power contact may cause its dielectric strength to be degraded to the point where the conductors will be energized. This might also occur on undamaged wire if lightning were to puncture the insulation on a rural or urban wire in contact with a power conductor.

★ ★ ★

Because of the possibility of conductor energization, rural and urban wires are treated as open-wire conductors, which means that fused-type station protectors must be used on stations that they serve. For power systems with voltages-to-ground of less than 3 kv., the fuse in the subscriber's station protector will blow and isolate the station, should the wire facility become energized. For power systems with voltages-to-ground greater than 3 kv., an energized conductor may have sufficient potential on it to cause the station fuse to blow and hold over. It is necessary in such a case to apply the same rules which hold for higher voltage joint use on open wire. These requirements call for spaced supplementary protection

SAVE ON FREIGHT AND ASSEMBLY COSTS

ALL SIZES OF
REELS
for
WIRE ROPE
and
INSULATED WIRE AND CABLE

LIGHT WEIGHT WAREHOUSE REELS
and
REGULAR PRODUCTION REELS

Let us show you HOW to SAVE on your assembly time!

MUNCY VALLEY INDUSTRIES, INC.
MUNCY VALLEY, PA.
Telephone: Muncy Valley 2131

Take Advantage of
DC OVERPOTENTIAL TESTING

A preferred method of checking insulation of cables.

- Non-Destructive.
- Leakage current measurement facilities.
- Small, inexpensive equipment.
- Complete safety features.
- Available from small unit pictured above, to very high potential units.

For New Catalog, write to
PESCHEL ELECTRONICS, INC.
13 GARDEN ST., NEW ROCHELLE, N.Y.
New Rochelle 6-3342

DIAMOND POWDER

Virgin or Reclaimed — All sizes

Finest Diamond Salvage Services Available

▼ ▼ ▼

INDUSTRIAL DIAMOND POWDERS, INC.

Box 10602, Pittsburgh 35, Pa.

Telephone: SYcamore 3-3308

MUSIC WIRE and SPECIAL WIRES

Music Wire for Industrial Purposes
211 sizes Bright Polished, .0015" to .3437"
45 sizes Bright Tinned, .003" to .125"
Aluminum—Annealed—Belt Lacing—Brass, Soft and Spring—Copper, Bare and Tinned
Coppered Steel Spring—Galvanized—Tinned
Monel—Nickel Silver—Pure Soft Nickel—Oil Tempered, Steel Spring, Black Finish
Phosphor Bronze, Spring Temper—Pure Iron Wire—Resistance Wire,
Hoskins Chromel "A"—Stainless, Soft and Spring Temper—Tag Wire, 1000
in an Envelope—Florist Wire—Spooled and Coiled, ¼-½-1-5#
Wires Straightened and Cut to length—Small Gauges—Small orders our specialty
Wires and Strands for the fishermen. Trolling Wires, Copper-Monel-Stainless.
Leader Wires, "Wilstabrite" Stainless and "Silverbrite" Music.

THE MALIN & COMPANY

2514 Vestry Ave. Established in 1884 Cleveland 13, Ohio

Cut Your Product Cost . . .

Stop struggling with wire worries. There's a Continental wire to help cut products costs — to add sales appeal. Let us know about your problem . . . Let Continental's helpful wire service work for you.

CONTINENTAL STEEL CORP. STEEL CONTINENTAL WIRE KOKOMO, IND.

*Trade Mark Reg. U. S. Pat. Off.

CONTINENTAL STEEL

CONTINENTAL STEEL CORPORATION

GENERAL OFFICES • KOKOMO, INDIANA

PRODUCERS OF Manufacturer's Wire in many sizes, shapes, tempers and finishes, including Galvanized. KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, Lead Coated, and special wire. ALSO, Coated and Uncoated Steel Sheets, Nails, Continental Chain Link Fence, and other products.

REELS • SPOOLS

ALL SIZES

WOOD - PLYWOOD - WOOD - METAL

RETURNABLE NON-RETURNABLE

Samples and Prices on Request

DURKEE MFG. CO., INC. PINE RIVER, MINN.

between each of the conductors and ground. Ground is supplied by the support wire, which must therefore be connected to the power system multi-grounded neutral.

★ ★ ★

Grounding of the support wire tends to furnish the equivalent of a grounded metallic cable sheath. It is true that the support wire is insulated and is situated in the middle of the wire structure, but tests have shown that there is almost always an arcing type of contact when plastic insulated conductors are energized. The heat of the arc often causes the support wire to be energized also at the point of contact. When it becomes energized, the fault impedance is lowered, which tends to hold down the plant potential rise and at the same time hastens deenergization of the power supply.

★ ★ ★

The spaced supplementary protectors furnish a low impedance fault path to ground and assure prompt and positive deenergization of the power system. They also hold down the voltage on the telephone plant to prevent holdover of the station fuse. Because of the different sized conductors involved, rural wires are protected at ½ mile intervals and urban wires are protected at ¼ mile intervals. In addition, both facilities should be protected at or very near both ends. If, in the remote case, the stations are few and widely spaced, supplementary protection at the drop locations and at the ends of the wire facility will be less expensive than regularly spaced supplementary protectors. This latter scheme is clearly more difficult to administer if stations may be added along the wire route at a later date.

The Predetermination of Tensile Strengths in Steel Wire Manufacture

(*Continued from page* 553)

tion to these points, combined with the application of a sound method of predicting ultimate tensile strength, such as the one described which is quite simple and applicable in either table or graph form, or by rapid slide rule calculation as and when required.

Regarding Chains

(*Continued from page* 547)

installation a hardening to resist wear and tear.

★ ★ ★

In addition to the above-mentioned chain-hooks, the knotted Victor and Hercules chains are manufactured. The advantage of the knotted chains lies in the fact that they are wound in one operation and manufactured without welding and accordingly possess an extraordinary tensile strength.

★ ★ ★

Performance of the chain bending machines made by Meyer, Roth & Pastor:

Thickness in mm. about	Links bent per minute about
1 - 4	130
2 - 6	110
4 - 10	90
7 - 13	80
10 - 16	60
12 - 18	50
13 - 20	40
18 - 25	30

Performance of the chain welding machines made by Meyer, Roth & Pastor:

1.5-2.5	80 - 100
2 - 4	60 - 80
3 - 6	50 - 60
4 - 8	33 - 50
6 - 10	22 - 35
8 - 13	15 - 25
11 - 16	10 - 17
14 - 18	7 - 12
16 - 20	4 - 10
18 - 25	2 - 8

These figures cannot be given with certainty because the link length as well as the material analysis (carbon content) play a significant role. Also, it depends to a certain degree on the operator's skill and good will.

Progress Through Research

(*Continued from page* 540)

wire for spark plug electrodes and wire for welding rods, development of high resistance wire, studies of coatings and lubricants for cold forming titanium, drawing of rare metals, development of a high-strength, high-conductivity copper-silver alloy, and improvement of thermocouple wire. Future plans include an emphasis on process research, including studies of metal mechanics. Meanwhile, the Institute continues to expand its facilities and staff in order to service the research needs of industry.

BARE ELECTRICAL TINSEL CONDUCTOR for Telephone • Razor • Hearing Aid Cords

Silver Coated Copper Wire
Round for Kel-F & Teflon Insulated Radio and Instrument Hook-up Wire and UHF Cables.
Flat for Tinsel Ribbons and Tinsel Garlands.

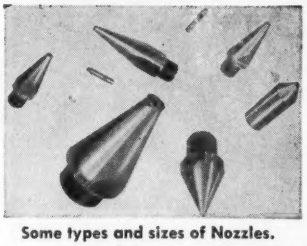
NEVA-TARN—Metallic Yarns—Non Tarnishing—for knitted and woven fabrics.
Novelty Yarns — All Constructions

THE MONTGOMERY COMPANY
Est. 1871
25 CANAL STREET Tel.: National 3-3338 WINDSOR LOCKS, CONN.

WE BUY WE SELL

We Pay Highest Prices for Used Machinery
16-CARRIER WARDWELL BRAIDERS
7-WIRE STRANDERS
All Machines Reconditioned in Our Own Shop
WIRE & TEXTILE MACHINERY INC.
P. O. BOX 436, PAWTUCKET, R. I.

Get High EXTRUSION PRODUCTION



Some types and sizes of Nozzles.

with CARBIDE NOZZLES
(made for all makes of *Extruders* for electric wire)

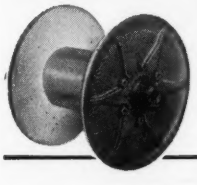
One major Electric Wire and Cable concern has produced over 40 MILLION FEET of electric wire with our NOZZLES. It is still in perfect condition and producing daily.

They will save you money!

You, too, can enjoy these savings. Write or call
WIRE TOOL DIVISION
BRIDGEPORT JIG BORING COMPANY
302 STRATFORD AVE., BRIDGEPORT, CONN. TEL.: FOREST 7-8473

MILTON MACHINE
RUGGED in design... DEPENDABLE in service!

Save on replacement and maintenance!
RUGGED STEEL HEAVY DUTY PROCESSING REELS



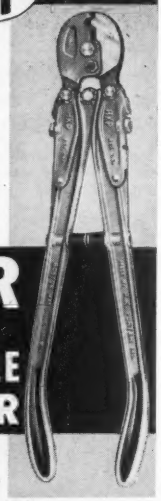
Having trouble with light weight reels failing in heavy duty service? Send us a sketch or print stating the limiting dimensions and service required, we'll be glad to tell you about our facilities for supplying the wire rope and cable industry with special heavy duty processing reels, spools or bobbins. WRITE FOR BULLETIN 52-W.

MILTON MACHINE WORKS, Inc.
DESIGNERS – ENGINEERS – MANUFACTURERS
MILTON • PENNA.

ANOTHER HKP LEADER

CLEAN CUTTING SHEAR ACTION

Cut coarse or fine stranded material cleanly with this Porter Notched Shear Cable Cutter. No crushing or deforming of cable. Capacity — up to ¾" cable and wire rope.



PORTER Notched Shear STEEL CABLE CUTTER

— FOR CUTTING RODS Ask for —

PORTER Center-Cut CUTTERS

For general cutting of soft or medium hard rods, up to ⅝" diameter. Porter No. 4CCRE Round Edge Center Cut Cutter for cutting hard rods up to ½" diameter.

Order from your supplier or write direct to

H. K. PORTER, INC. Somerville 43, Mass.

New Ownership for Standard Mill Supply

LeRoy F. Ott, President of **Standard Mill Supply Company,** Pawtucket, R. I., since 1936, announced his retirement as President, effective March 23, 1956. **William H. Streit,** Vice President since 1951, has purchased Mr. Ott's interest and will head the firm as President.

★ ★ ★

Now in its sixtieth year, the company was founded in 1896. Mr. Ott became affiliated with the company in 1922 as a salesman and continued in that capacity until 1932 when he became controlling stockholder. He became President upon the death of **John S. Merchant** at the end of 1936.

★ ★ ★

The company deals in textile machinery, mill supplies and equipment as well as equipment and supplies for the wire industry, the plastic and paper trades and allied industries. More especially, Standard Mill Supply Company has been known as a dealer in used and reconditioned textile winding machinery. In 1941 the company expanded services to wire mills.

★ ★ ★

Standard Mill is represented the world over. In 1916 domestic sales were broadened into foreign export. In that year approximately twenty-four new textile mills were established in China, with about 75% of them using equipment supplied by Standard. The firm exports frequently to Europe, Latin America and Canada.

★ ★ ★

Mr. Streit announced that there would be no changes in personnel. **Harold B. Cameron** will become Vice President in charge of sales. **Alexander A. Glod** will serve as Export Sales Manager and **Alfred F. Dewing** will continue as Secretary and Treasurer.

PRIMARY ALUMINUM PRODUCTION
IN THE UNITED STATES
(in pounds)

1956	
March	291,875,457
February	265,524,546
Total for year through March	838,187,671
1955	
March	260,543,479
Total for year through March	749,423,226
All-time record month	
March 1956	291,875,457
All-time record quarter	
1st 1956	838,187,671

Note: The following figures for 1955 have been revised:

August	267,081,664
September	261,231,951
October	269,313,822
December	281,364,01P
Year 1955	3,131,439,251

Aluminum Statistics

Ervin S. Mummert

The Mummert-Dixon Company, Hanover, Pa., manufacturers of wire-weaving equipment, announces with profound sorrow the death of **Ervin S. Mummert,** President and General Manager, on March 11, 1956.

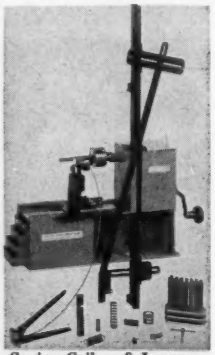
wire working MACHINERY

TO MAKE SINGLE LOOP BALE TIES
FENCE AND POULTRY NETTING STAPLES
WIRE GARMENT HANGERS — NAIL GALVANIZERS
CARBIDE NAIL TOOLING

Seybold Transworld Exporters

122 EAST 42nd STREET, NEW YORK 17, N. Y., U.S.A.

SPRING MACHINES



Spring Coilers & Loopers
Grinders & Carbide Tools

For coiling Compression, Extension and Torsion springs. Ideal for making samples and small lots up to 1000 quickly and accurately.

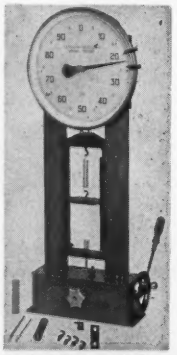
Available in two sizes.

For testing loads and deflections of Compression and Extension springs.

Available in four capacities: 25, 100, 200 and 300 lbs.

Write for prices and bulletins.

THE CARLSON COMPANY
277 Broadway, New York 7, N. Y.
Phone BArclay 7-2552



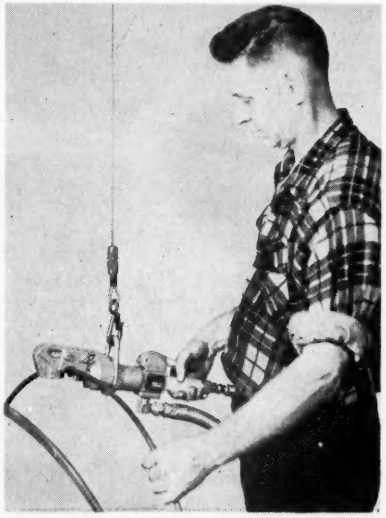
Spring Testers & Ovens
Electronic Gauging

Redesigned Line of Hydraulic Guillotine Wire and Rod Cutters Announced

The Manco Mfg. Co. has announced that their line of high speed Guillotine cutters have been completely re-engineered for better performance, with particular emphasis on low maintenance cost.

★ ★ ★

A new valve design of substantially greater capacity gives a faster operating cycle. For low maintenance the number of operating parts has been reduced and parts are now hardened and ground. A new floating Meehanite piston allows freedom of alignment



Newly redesigned Manco Hydraulic Guillotine Wire and Rod Cutter, Model MC-210. * * * *

and has six times more bearing surface than on previous models. A new seal assembly permits easy replacement as a unit.

★ ★ ★

A further innovation is the interchangeable blade and anvil, so that wear points can be reversed for virtually double blade life. Three blade styles are offered for cutting various types of material.

★ ★ ★

These new cutters, according to the manufacturer, are ideal for production cutting of coiled wire, trimming off cobbled ends, taking test samples and splitting bundles on docks. Three models are available. Model MC-210 with ½" diameter capacity has an operating cycle of ½ second per cut. Weight is 13 lbs. Model MC-35 cuts 1" diameter steel in 1-¼ seconds. Weight is 44 lbs. Model MC-65 cuts 1-¼" diameter steel in 2 seconds per cut and weighs 120 lbs.

★ ★ ★

The units are powered by a Manco 5 h.p. Series "H" Hi-Thrust electric hydraulic pump. The company is accepting trade-ins on previous Models—200-HV-2L, 20-HV-1 and 21-HV-2L. For complete information and catalog write Manco Mfg. Co., Bradley, Illinois.

Century Old Suspension Bridge to Be Made National Memorial

Dr. D. B. Steinman will be the principal speaker on May 20, 1956 at the ceremonies when the Wheeling Suspension Bridge will be dedicated into a national memorial to **John A. Roebling** and to engineers generally.

★ ★ ★

The bridge was designed and built by Mr. Roebling. It was completed in 1856 and was the first bridge to span the Ohio River.

BALLOFFET VIANNEY WIRE DIE CO., Inc.

All sizes from .081" down to .0004" in stock from New York.

Manufacturers of Quality diamond dies since 1870

BALLOFFET VIANNEY WIRE DIE CO., Inc.
6825 ADAMS ST., GUTTENBERG, N. J.
Tel: Union 3-3393

WAYNE WIRE DRAWING DIES

Quality in Diamonds + Perfection in Workmanship = Good Wire

Satisfactory DIAMOND DIES can only be made by those who have experience, skill and knowledge. WAYNE has all of these. Users have called WAYNE DIES "the best."

WAYNE WIRE DIE CO., 200 Pennsylvania Ave., Hillside, N. J. Telephone: Elizabeth 2-2456

TUNGSTEN CARBIDE WIRE DRAWING DIES

DESIGNED FOR LONG LIFE AND MAXIMUM WIRE PRODUCTION

Furnished semi-finished to within .001" to .002" of finished size at rough-drilled die prices. Require only light sizing and polishing before using. Our dies embody special design features that make for superior performance.

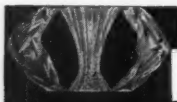
Also, a full line of carbide tooling for the Cold Heading Industry

EASTERN CARBIDE CORPORATION
NEW ROCHELLE, N. Y.

DIAMOND
and
TUNGSTEN CARBIDE
DIES
for all WIRE DRAWING purposes.
SPECIALISTS IN DIE REPAIR
WORK ON ALL TYPES OF DIES.
UNIVERSAL WIRE DIE CO.
951 Lincoln Ave., Cranford, N. J.
CRanford 6-0116

DIAMOND DIES .0006 - .120 DIAMOND POWDER
INDUSTRIAL
AJAX
SUPPLIES INC.
R.R. 4, P. O. Box 66, Fort Wayne, Ind.

NEW ENGLAND WIRE DIE CO.
7 Forsberg St., Worcester, Mass.
EXPERT RECUTTING
DIAMOND DIES, DIAMOND POWDERS
Eastern Representative of
Ajax Industrial Supplies, Inc.


DIAMOND DIES
PROFILED DIES
FINE SIZE DIES
VICTOR J. BOULIN INC.
10 FIRST STREET, PELHAM, N. Y.

DIAMOND POWDER
Diamond Reclaiming Services
FORT WAYNE DIAMOND PRODUCTS, Inc.
2623 E. Pontiac Fort Wayne 5, Indiana

DIAMOND CARBIDE
DIES
KELLY
WIRE DIE CORPORATION
19 W. 34th St. New York

Wire
Drawing
Diamond
Dies

COCHAUD
WIRE DIE INC.
2208 Summit Ave., Union City, N. J.
UNion 4-4231

When completed it was the longest suspension span in the world and is now, in its 100th Anniversary Year, the oldest existing suspension bridge.

★ ★ ★

No man is better qualified than Dr. Steinman to honor John A. Roebling and the old Wheeling Suspension Bridge. He is one of the world's foremost authorities on suspension bridges as well as on the life and work of John A. Roebling. In fact it was his close proximity to the Brooklyn Bridge, during his childhood, that inspired him to become a bridge builder and authority on the life of John A. Roebling, the designer and builder of the Brooklyn Bridge. So intertwined is Steinman's life with that of Mr. Roebling that he even insists on keeping his offices in the Roebling Building, 117 Liberty Street, New York, in the shadow of the Brooklyn Bridge.

Drawn Shaped Hollow Mandrels

(*Continued from page* 538)

and finishing pass, the diameter was undersized by, again, a mil. Further experimentation resulted in a satisfactory procedure, as follows: The Kovar tubing with a wall thickness of 0.009-inches is drawn from 0.250-inches O.D. to 0.187-inches O.D. cold, then annealed at 1000°C in H_2 with a schedule of one minute per foot. The annealed piece of 0.187-inches is drawn cold through the breakdown die, and then cold through the finishing die. At this point, the mandrel is re-annealed on the same schedule. A 0.041-inch diam-

CARBIDE NAIL TOOLING
for
Glader—National-Wikschtrom
Nail Machines
PITTSBURGH CARBIDE DIE CO.
Monongahela, Penna. BLackburn 8-6959

DIAMOND WIRE DRAWING DIES
DIAMOND POWDER AND
COMPOUNDS
DIE RECUTTING SERVICE
CARBIDE DIES • TOOLS • PARTS
RUSCH WIRE DIE CORPORATION
CROTON-ON-HUDSON, N. Y.

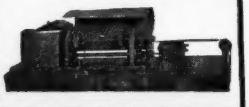
DIAMOND POWDERS
Expert Reclaiming Service
MOLINA-STRAUS
DIAMOND PRODUCTS COMPANY
527 Fifth Ave., New York 17, N. Y.
Tel.: MUrray Hill 7-6825

"NATDI"
A REVERSIBLE DIAMOND DIE
GREATER INITIAL PRODUCTION
MORE RECUTS — LONGER LIFE
NATIONAL WIRE DIE CO.
30 IRVING PLACE, NEW YORK 3, N. Y.

DIAMOND WIRE DRAWING DIES
and DIAMOND POWDER
INDIANA WIRE DIE COMPANY
314-324 E. Wallace St., Fort Wayne, Indiana
Phone: Harrison 4373

DIAMOND DIES
.000's to .102"
For many years . . .
Outstanding in quality,
workmanship and service.
FORT WAYNE WIRE DIE, INC.
2625 E. Pontiac St., Fort Wayne, Ind.

DIAMOND DIES
mounted unmounted
For Precision Wire Drawing
BRENON, INC.
Experts in Fine Size Diamond Dies
R.F.D. #5, Box 400, New Brunswick, N. J.

MODEL
T-3
TORSION
TESTER
FOR WIRE

SCOTT TESTERS INC. 55 BLACKSTONE ST. PROVIDENCE 1, R.I.

WIRE BRIGHT TINNED
To Your Order
in Sizes .003" to .013"
STEEL • COPPER • BRONZE • BRASS
JURY'S WIRE PRODUCTS, INC.
24 Howard St. Bloomfield, N. J.

CLEVELAND TRAMRAIL
Division of
THE CLEVELAND CRANE & ENGINEERING CO.
WICKLIFFE, OHIO
Leading manufacturers of
OVERHEAD MATERIALS HANDLING EQUIPMENT
for the Wire and Wire Products Industry

TOOLS TALIDE DIES
WEAR PARTS
Talide Metal, the super hard tungsten carbide gives increased production, better finish, less down time and scrap on all wire mill operations.
METAL CARBIDES CORPORATION
YOUNGSTOWN 5, OHIO

For the finest quality
Stainless • Needle • Nickel Alloy
Specify
WEBB WIRE
division of The Carpenter Steel Company
New Brunswick, N. J.

FOR THE BEST IN Spiral Wrap
SPECIFY "Arksafe"
ARKELL SAFETY BAG CO., 10 E. 40th St., N. Y. 16, N. Y.

WOOD REELS and SPOOLS
American Woodworking Company
1" to 60" Diameters. Send $1.00 for our free catalogue of all wood products made in the U.S.A.
1674 N. Lowell Avenue
Chicago 39, Illinois

Wire Measuring...
PRODUCTIMETERS
Send for Catalog No. 40
Precision-built for accuracy and speed. Most complete line offered
DURANT MANUFACTURING CO.
1918 N. Buffum Street, Milwaukee 1, Wisconsin • 118 S. Water St., Providence 3, R. I.

WOOD & PLYWOOD REELS
for WIRE ROPE and
INSULATED WIRE & CABLE
THE NELSON COMPANY
Standard Oil Bldg., Baltimore 2, Md.

WORLD'S LARGEST MANUFACTURER
SPIRAL WRAPPING MACHINES
For Coils or Straight Lengths
Terkelsen Machine Company
323 A Street, Boston 10

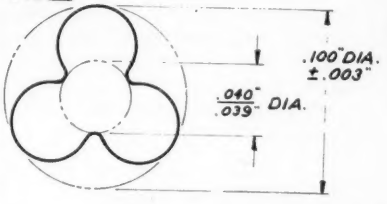
ZINC WIRE
THE PLATT BROS. & CO.
Waterbury 20, CONN.

eter piece of drill rod is inserted snugly into the mandrel, and this assembly is then cold drawn through the finishing die again. The anneal is sufficient to soften the Kovar enough to prevent any spring back, and the drill rod prevents a collapse of the tube. Inspection shows this method meets tolerances. By varying the wall thickness of the starting tube and/or varying the diameter of the drill rod, it is possible to increase or decrease the final I.D. of the mandrel. This variation becomes important in cases where helices may be slightly over- or undersized in relation to the standards.

★ ★ ★

When it became apparent that tolerances could be accurately met and that the process was economically feasible, a demand for a much

FIG III



smaller mandrel was made. (Fig. 3.) This mandrel was to have an O.D. of 0.100-inches ± 0.003-inches and an I.D. of 0.039-inches +1/ −0. Again, this was to be made of Kovar tubing. The approach was the same, that is, draw through a breakdown and a finishing die. Considerable difficulty was encountered, however, because of the relatively greater mass of material in relation to the I.D. Pointing of the mandrel for the final pass required a point which then did not have the strength to withstand the force required to draw through the finished die. An inter-

SLEEPER & HARTLEY, Inc.
Designers and Builders
SPRING COILERS
WIRE WORKING MACHINERY
WIRE MILL EQUIPMENT
SPECIAL MACHINERY
Address Inquiries to
Box 1249
WORCESTER, MASS.

CHEMSTEEL CONSTRUCTION COMPANY, INC.
205 Chemsteel Bldg., Walnut St., Pittsburgh 32, Pa.
Send data on Engineering & Construction facilities for
ACID-ALKALI-PROOF CONSTRUCTION
of pickling and other tanks; flooring.
(TEAR OUT & MAIL WITH LETTERHEAD)

WIRE DRAWING MACHINERY
AND EQUIPMENT
Rod Frames — 16" Frames, 8" Frames — Take-Up Frame, Wire — Pointers — Puller Tongs — General and heat resisting alloy castings for wire mill use.
Circulars on Request
E. J. SCUDDER FOUNDRY & MACHINE CO.
TRENTON, N. J.

EMORY
SPOOLERS AND TRAVERSES
ROBERT J. EMORY CO.
31 E. RUNYON ST., NEWARK 5, N. J.

Superior Quality - Low Cost
WIRE DRAWING LUBRICANTS
Wet and Dry—All Metals
SIXTH STREET • ROME, N. Y.
Write to
ROME SOAP MFG. COMPANY

CREPED PAPER
COIL OR BAR WRAPS
NATIONAL WATERPROOF PAPERS, INC.
BEVERLY 1, N. J.

NEP • SUMFOAM
ACID INHIBITOR • PICKLING COMPOUND
THE PARKIN CHEMICAL CO.
HIGHLAND BLDG. PITTSBURGH 6, PA.

STRAND-BUFFALO CORP.
No. Tonawanda, N. Y. (near Buffalo)
REELS
WOOD AND PLYWOOD
Manufactured to Your Specifications

STANDARD UNI-DRIVE
WIRE WINDER
WILL INCREASE YOUR PRODUCTION
Write for details.
STANDARD MILL SUPPLY
1064-1080 MAIN ST., PAWTUCKET, R. I.

Engineering and Professional Services

LANCASTER, ALLWINE & ROMMEL
REGISTERED PATENT ATTORNEYS
Suite 438, 815—15th St., N. W.
Washington 5, D. C.

•

Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request.

CONSULTING WIRE MILL ENGINEER
Specializing in Wire Mill Machinery, Plant Layout and Production Techniques.
CLARENCE S. ARMS
Sleeper & Hartley, Incorporated
P.O. Box 1249 • Worcester, Mass.

WANTED TO BUY
SMALL MANUFACTURING PLANT MAKING OR USING STEEL WIRE. EAST COAST AREA ONLY.
Reply to Box 849
WIRE AND WIRE PRODUCTS
453 Main Street Stamford, Conn.

FOR SALE
Holmes Rubber Slicer for high-speed cutting of extruded rubber stock. Complete with three horsepower motor, new condition, cost new $1,600.00. Priced for quick sale.
Reply to Box 855
WIRE AND WIRE PRODUCTS
453 Main St. Stamford, Conn.

WANTED
7-BAY STRANDERS
Must be in good condition
SOUTHERN STAINLESS STEEL WIRE CO.
Sarasota, Florida

SMALL CAPTIVE WIRE MILL
Philadelphia metropolitan area, producing alloy, high carbon and stainless alloys in full range from .002" and up for own use, needs man to take full charge. Plant is well equipped with only the best of modern equipment. This offers a challenging opportunity for growth and permanency with a long established company to a man with the experience and ability to handle successfully all phases of operation, including operator training, lay-out, scheduling and technical operating problems. Our organization knows of this ad.
BOX 857
WIRE & WIRE PRODUCTS

LINE—GORCY
mechanical
wire rod descalers
FISHER ASSOCIATES
122 East 42nd St., New York 17, N. Y.

Engineered Application of Heat in Continuous Processing Systems
INDUSTRIAL OVENS, INC.
13825 TRISKETT ROAD
CLEVELAND 11, OHIO

FOR SALE
1 used Descaling Machine-MR1412 "Victor Line-Gorcy" for descaling steel rods up to ¾" diameter. Made by Marshall Richards Machine Company, Ltd., Cook, County Durham, England. FOB Fostoria subject to prior sale.
Reply to Box 856
WIRE AND WIRE PRODUCTS

FOR SALE
1—40 KW Batch Type Annealing Furnace—50 CFH Atmosphere Controller—L & N Micromax Control.
2—Warwelliam Paper Serving Machine New.
1—Fidelity Sinfra Wire Covering Machine.
1—10 HP Kane Gas Boiler 300 lb. WP.
1—15 HP Kane Gas Boiler 300 lb. WP.
1—J80 Micro Welder.
Reply to Box 858
WIRE AND WIRE PRODUCTS
453 Main Street Stamford, Conn.

Immediately Available
WIRE WORKING MACHINERY
FOURSLIDES: Baird, Nilson & Manville, Nos. 0, 1, 2, 3, 4, 5, 3-20, 4-26
U. S. Tool Co. No. 22, 28, & 33 Multislides
Sleeper & Hartley Spring Coilers Nos. 0, 1, 2, 3, 3½, 4, & 5
Vaughn Nos. 8, 10, & 12 Moto-Blocs
Waterbury No. 3 Bull Blocks, Duplex
Morgan 4 stand Wire Drawer with pointer and 100 H.P. motor drive & motor
Waterbury Nos. 1, 2, & 3 Continuous Wire Drawing Machines
PARTIAL STOCK LISTING
"The most diversified stock of machinery in the country. If it's machinery we have it."
National Machinery Exchange
130 Mott St., New York 13, N. Y.
CAnal 6-2470

mediate die was made and no further trouble was encountered.

★ ★ ★

This mandrel did not require the insertion of the drill rod filler, as the mass of material prevented spring-back. The schedule calls for an anneal of the "as received" Kovar, cold drawing through the breakdown die, an anneal, cold draw through the intermediate die, an anneal, and cold draw through the finishing die.

★ ★ ★

As previously stated, the mandrels must be free of bow and/or twist. In order to accomplish this, the cold drawn mandrels are annealed, cut into three-foot plus lengths, and placed between the jaws of a tensile test machine (in production, a simply designed machine could be substituted). These pieces are then stretched to about a ½ per cent elongation. This operation serves to straighten and to eliminate any twist which may be present.

★ ★ ★

This process for the production of expendable mandrels has made possible the elimination of mandrels made from assemblies of three rods welded together. It has made it possible to shrink the glass to its final size without lapping out of any excess and has made possible (by the use of tubing) speeding up the etching out process from about eight hours to twenty minutes for a tube, about 12 inches long. This method also allows production of mandrel sizes much smaller than may be feasible by the original method.

★ ★ ★

Appreciation should be given for the cooperation and suggestions, by **Union Wire Die Corporation** of New York, and for the excellent design work of **Mr. E. Haffner,** Sylvania and **Mr. Richard Sichler,** Sylvania, for his enthusiasm and helpful suggestions in the actual drawing of the mandrels.

Becomes Director of English Machinery Firm

Marshall Richards Machine Company Ltd., has announced the election of **G. Stuart Wood** to the Board of Directors of the company, which is well-known at home and abroad for its manufacture of machinery for the wire and tube drawing industries.

Index to Advertisers

A

Acrometal Products, Inc. ..... 542 and 543
Ajax Industrial Supplies, Inc. 600
Alabama Wire Co., Inc. 511
Alloy Metal Wire Div., H. K. Porter Co., Inc. 567
American Chemical Paint Co. 518
American Insulating Machinery Company 582
American Steel & Wire Div., U. S. Steel Corp. 501
American Woodworking Co. 601
Apco Mossberg Co. 568
Apex Alkali Products Co. 495
Arkell Safety Bag Company ..... 574 and 601
Arms, Clarence S. 602

B

Baird Machine Company, The 513
Baker (Imports) Co., Inc., James S. 594
Balloffet-Vianney Wire Die Co., Inc. 599
Boulin, Victor J., Inc. 600
Boyd & Sons Mfg. Corp. 588
Brenon, Inc. 600
Bridge Mfg. Co. 505

C

Camden Wire Co., Inc. 583
Carboloy Dept. of General Electric Co. 502
Carl Mayer Corp., The 589
Carlson Company, The 598
Carpenter Steel Company-Webb Wire Division ..... 590 and 601
Carris Reels 586
Carter Company, Ltd., B. & F. 592
Chase Brass & Copper Co. 503
Chemical Products Corp. 565
Chemsteel Construction Co., Inc. 601
Cleveland Tramrail Division of The Cleveland Crane & Engineering Co. 600
Cochaud Wire Die Inc. 600
Colorado Fuel & Iron Corporation ..... 508 and 509
Continental Can Company ..... Inside Front Cover
Continental Steel Corporation 596
Cook Mfg. Co. 578
Coulter & McKenzie Machine Co., Inc., The 546
Crafts, Arthur A., Co., Inc. 589

D

Danforth Co., C. W., The 594
Davis-Standard Sales Corp. 524-B
Du Pont E. I. de Nemours Company 523
Durant Mfg. Co. 601
Durkee Mfg. Co., Inc. 596
Dykrex Corporation of America—Roos Tool & Mfg. Div. 587

E

Eastern Carbide Corp. 599
Edmands Company, The 590
Electric Furnace Company, The ..... Back Cover
Electronic Rubber Co. 592
Elgin National Watch Co., Abrasives Div. 554
Emory, Robert J., Company 601
Entwistle Manufacturing Corp. 494

F

Fisher Associates 602
Fort Wayne Diamond Products, Inc. 600
Fort Wayne Wire Die, Inc. 600

G

Gas Machinery Corp., The 531
Glader, Wm., Machine Works 571

H

Haskell-Dawes Machine Co. 588
Heany Industrial Ceramics Corp. 594
Herborn Maschinenfabrik 519
Hubbard Spool Company 577

I

Indiana Wire Die Company 600
Industrial Diamond Powders, Inc. 596
Industrial Ovens, Inc. 602
International Fine Wire Co., Inc. 573

J

Johnson Steel & Wire Company, Inc. ..... 516 & 517
Jones & Laughlin Steel Corp. ..... 499 & 522
Jury's Wire Products Inc. 600

K

Kellogg Company, M. W., Chemical Mfg. Div. 527
Kelly Wire Die Corp. 600
Kennametal, Inc. 512
Keystone Steel & Wire Co. 570

L

Lancaster, Allwine & Rommel 602
Larmuth (1947), Ltd. 591

M

Machinenfabrik Niehaus, K. A. 584
Malin & Company, The 596
Mason Can Company 575
Metal Carbides Corporation 601
Mettler Machine Tool, Inc. 504
Michigan Oven Co. ..... 532 & 533
Micro Products Company 563
Miller, R. H. Co., Inc. 536
Milton Machine Works, Inc. 597
Molina-Straus Diamond Products Co. 600
Monsanto Chemical Co., Plastics Division 528
Montgomery Co., The 597
Morgan Construction Company 496
Morgardshammars Mek. Verkstads A. B. 529
Mossberg Pressed Steel Corp. 572
Mumment-Dixon Co. 591
Muncy Valley Industries, Inc. 595

N

National Machinery Exchange 602
National Research Co. 594
National Standard Co. 498
National Waterproof Papers, Inc. 601
National Wire Die Company 600
Nelson, Co., The 601
New England Butt Co. 506
New England Wire Die Co. 600
North Anson Reel Co. 515
Norton Company 585

P

Pacific Coast Borax Company 586
Parkin Chemical Co., The 601
Peschel Electronics, Inc. 595
Pittsburgh Carbide Die Co. 600
Pittsburgh Plate Glass Co. 510
Pittsburgh Steel Company ..... 516 & 517
Platt Brothers & Co., The 601
Plymouth Cordage Company 579
Porter, H. K., Inc. 598

R

Republic Steel Corp., Pressed Steel Div. 497
Robinson, M. W., Co., Inc. 595
Roebling's, John A. Sons, Corp. 524A
Rome Soap Mfg. Co. 601
Royle, John & Sons 576
Rusch Wire Die Corporation 600

S

Scott Testers, Inc. 600
Scudder, E. J., Foundry and Machine Co. 601
Seybold Transworld Exporters 598
Sjogren Tool and Machine Co., Inc. 593
Sleeper & Hartley, Inc. 601
Standard Industrial Compounds Co., Inc. 493
Standard Mill Supply Co. 601
Strand-Buffalo Corp. 601
Swift & Company 520
Syncro Machine Co. 514

T

Terkelsen Machine Company 601
Titan Metal Mfg. Co. 569
Torrington Mfg. Co., The 521

U

Union Wire Die Corp. 593
U. S. Industrial Diamond Products 581
U. S. Steel Corporation, American Steel & Wire Div. 501
United Wire & Supply Co. 564
Universal Wire Die Co. 600

V

Vascoloy-Ramet Corp. 534
Vaughn Machinery Co., The ..... Front Cover

W

Wafios Maschinenfabrik 500
Wardwell Braiding Machine Co. 566
Warren Wire Company 525
Waterbury Farrel Foundry & Machine Co. 524
Watson Machine Co., The ..... Inside Back Cover
Wayne Wire Die Co. 599
Whittaker, Clark & Daniels 581
Wilson, Lee, Engineering Co., Inc. 507
Wire Equipment Mfg. Co., Inc. 595
Wire & Textile Machinery, Inc. 597
Wire Tool Div., Bridgeport Jig Boring Co. 597

Y

Youngstown Sheet & Tube Co., The 526

WHERE TO BUY

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.
Only advertisers who have contracted for six or more insertions are listed in this section.

ABRASIVES—
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Norton Co., Worcester, Mass.
United States Industrial Diamond Corp., New York, N. Y.

ACID INHIBITORS—
(See Inhibitors, Pickling)

ACID-PROOF CONSTRUCTION—
Chemsteel Construction Co., Inc., Pittsburgh, Pa.

ADJUSTABLE SPEED DRIVES
The Louis Allis Company, Milwaukee, Wisc.

ANNEALING MACHINES — Electric Resistance
Syncro Machine Co., Perth Amboy, N. J.

ANNEALING POTS AND BOXES—
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

BAKERS—
(See OVENS—Rod Bakers)

BOBBINS—Braider & Wire Weaving
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Carter & Co., Ltd., B. & F., Bolton, England.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket. R. I.

BORAX—Wire Drawing
Pacific Coast Borax Co., New York, N. Y.

BORON CARBIDE—
Norton Co., Worcester, Mass.

CABLE FILLERS—Paper
Plymouth Cordage Company, Plymouth, Mass.

CAPSTANS—for Wire
Litzler, C.A., Co., Inc., Cleveland, Ohio.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Carter & Co., Ltd., B. & F., Bolton, England.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket. R. I.

CASTINGS—Wire Mill
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Phila., Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Parkin Chemical Co., The, Pittsburgh, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

CLEANING & PICKLING EQUIP.—
Chemsteel Construction Co., Inc., Pittsburgh, Pa.
Cleveland Tramrail Div., of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee Engr. Co., Cleveland, Ohio
Youngstown Welding & Eng'g Co., Youngstown, Ohio.

CLOTH—WIRE, All Metals
Baker, James S., (Imports) Co., 311 California St., San Francisco, Calif.
Chase Brass & Copper Co., Waterbury, Conn.
Wickwire Bros., Cortland, N. Y.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Pennsylvania Salt Mfg. Company, Philadelphia, Pa.
Standard Industrial Compounds Co., Frankfort, Ill.

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.
Miller, R. H. Co., Inc., Homer, N. Y.

COMPOUNDS—Diamond (Pre-Mixed)
Eastern Carbide Corp., New Rochelle, N. Y.
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago.
Rusch Wire Die Corporation, Croton-on-Hudson, N. Y.
Union Wire Die Corporation, New York, N. Y.
Whittaker, Clark & Daniel, Inc., New York, N. Y.

COMPOUNDS—Extrusion, for Wire
Electronic Rubber Co., Stamford, Conn.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.

COMPOUNDS—For Improving Drawing and Extrusion
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

COMPOUNDS—Phosphate Coating
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corporation, Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.

COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

COMPOUNDS, Vinyl
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H. Co., Inc., Homer, N. Y.
Pacific Coast Borax Co., New York, N. Y.
Pennsylvania Salt Mfg. Company, Philadelphia, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Swift & Company, Chicago, Ill.

CONDUCTORS—Flexible, Electrical
Montgomery Co., The, Windsor Locks, Conn.

CONTAINERS—Wire Packaging
(See DRUMS—Wire Packaging)

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Carter & Co., Ltd., B. & F., Bolton, England.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire & Textile Mach'y, Inc. (used) Pawtucket. R. I.

CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

COUNTERS—
(See MACHINERY—Measuring Wire and Cable)

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Carboloy Dept. of General Electric Co., Detroit.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Metal Carbides Corporation, Youngstown, Ohio
Vascoloy-Ramet Corp., Waukegan, Ill.

CUTTING TOOLS—Wire
Porter, H. K. Inc., Somerville, Mass.
Robinson, M. W. Co., Rockfall, Conn.

DIAMONDS—Industrial
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Molina-Straus Diamond Products Co., New York, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
United States Industrial Diamond Corp., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDERS—
Danforth, The C. W. Co., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
Molina-Straus Diamond Products Co., New York, N. Y.
National Research Company, St. Clair Shores, Mich.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Union Wire Die Corporation, New York, N. Y.
United States Industrial Diamond Corp., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDER RECLAIMING—
Danforth, The C. W. Co., Youngstown, Ohio
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
National Research Co., St. Clair Shores, Mich.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Union Wire Die Corporation, New York, N. Y.

DIAMOND TOOLS—
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio
Molina-Straus Diamond Products Co., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Carbide, Tungsten & Tantalum
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Carboloy Dept. of General Electric Co., Detroit.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Cold Heading
Carboloy Dept. of General Electric Co., Detroit.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio
Union Wire Die Corporation, New York, N. Y.
Vascoloy-Ramet Corp., Waukegan, Ill.

DIES—Diamond
Ajax Industrial Supplies, Inc., Ft. Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., New Brunswick, N. J.
Cochaud Wire Die Inc., New York, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N.Y.
Union Wire Die Corporation, New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES DIAMOND—Reversible
National Wire Die Co., New York, N. Y.

DIES—Extrusion
Carboloy Dept. of General Electric Co., Detroit.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Metal Carbides Corporation, Youngstown, Ohio
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.

DIES—Nail, Nail Cutters, Feeder Blocks, Grippers, etc.
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc, New York, N. Y.
Carboloy Dept. of General Electric Co., Detroit.
Cochaud Wire Die Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Ft. Wayne Wire Die., Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Union Wire Die Corporation, New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.

DIES—Swaging
Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Dept. of General Electric Co., Detroit.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y
Vascoloy-Ramet Corp., Waukegan, Ill.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRIVES—Electric, Adjustable Speed
The Louis Allis Company, Milwaukee, Wisc.

DRUMS—Wire Packaging
Continental Can Company, Van Wert, Ohio

DRUMS & TRAVERSES—For Cable Reels
Hubbard Spool Co., Garrett, Ind.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio

DRYING EQUIPMENT
Carl Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.

ENGINEERS—Consulting
Lubricants—Hans C. Bick, Inc., Reading, Pa.
Wire Mill—Clarence S. Arms, Worcester, Mass.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

FREQUENCY CHANGERS
The Louis Allis Company, Milwaukee, Wisc.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Galvanizing Equipment
Ajax Electric Co., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Heat Treating
Ajax Electric Co., Philadelphia, Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Drever Company, Bethayres, Pa.
Electric Furnace Co., Salem, Ohio
Rockwell, W. S., Co., Fairfield, Conn.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Resistance Heating, Strand
(See Annealing Machines)

FURNACES—Salt Bath
Ajax Electric Co., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Strand Annealing
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.

GAUGES—Wire Diameter, Continuous
Industrial Gauges Corporation, West Englewood, N. J.

GALVANIZING EQUIPMENT — (See MACHINERY—Galvanizing Wire)

GEARMOTORS
The Louis Allis Company, Milwaukee, Wisc.

GRINDERS—Roll
Norton Co., The, Worchester, Mass.

GUIDES—For Wire
Heany Industrial Ceramic Corp., New Haven, Conn.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HARDSURFACING ALLOYS—
(See Alloys—Hardsurfacing)

HOOKS—Pickling & Liming
Youngstown Welding & Eng'g' Co., Youngstown, Ohio

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INKS—Printing, for Insulated Wire
Kellogg Company, M. W., Chemical Manufacturing Division, Jersey City, N. J.

INSULATING MATERIALS—
Celanese Corporation of America, New York, N. Y.
Chemical Products Co., E. Providence, R. I.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
Electronic Rubber Co., Stamford, Conn.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Pittsburgh Plate Glass Company, Pittsburgh, Pa.
Plymouth Cordage Company, Plymouth, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.

INSULATING MATERIALS—Paper (For Electric Wire Cable)
Plymouth Cordage Company, Plymouth, Mass.

LACQUERING SYSTEMS — See MACH.—Lacquering Electric Wire

LACQUERS—For Electric Wire
Chemical Products Co., E. Providence, R. I.

LAGGING—Reel
North Anson Reel Co., No. Anson, Me.

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LIME—
Warner Co., The, Philadelphia and Bellefonte, Pa.

LUBRICANTS — For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Rome Soap Mfg. Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire, Hose)
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Bending Wire
Eisler Engineering Co., Newark, N. J.

MACHINERY—Bobbin Winders
Cedar West Tool Inc., New York, N. Y.
Mummert-Dixon Company, Hanover, Pa.
Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Braiding
Carter & Co., Ltd., B. & F., Bolton, England.
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Haskell-Dawes Machine Co Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Synero Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Capstans and Machinery—Winding Wire)

MACHINERY—Chain Making
Nilson, A. H. Machine Co., Bridgeport, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Closing Rope
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling Rod
Vaughn Mach'y Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Cold Heading
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Coil Wrapping (Paper)
Angier Corporation, Framingham, Mass.

MACHINERY—Copper Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
National Mach'y Exch. (Used), New York.
Synero Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Cutting
Eisler Engineering Co., Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
Wells, Frank L., Co., Kenosha, Wis.

MACHINERY—Descaling Rod, Dry
Fisher Associates, New York, N. Y.
Herborn, Herborn, Germany.

MACHINERY—Die Making
Boulin, Victor J., Inc., New York, N. Y.
Carboloy Dept. General Electric Co., Detroit, Mich.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Firth Sterling, Inc., Pittsburgh, Pa.
Union Wire Die Corporation, New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging (See MACHINERY — Tandem Rolling and Edging Mills)

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio.
Michigan Oven, Company, Detroit, Mich.
Rockwell Co., W. S., Fairfield, Conn.

MACHINERY—Extruding
Davis-Standard Sales Corp., Mystic, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.

MACHINERY—Flat Wire
Fenn Manufacturing Co., Newington, Conn.
Mettler Machine Tool, Inc., New Haven, Conn.
Rockwell, W. S., Company, Fairfield, Conn.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming Wire
Baird Machine Co., Stratford, Conn.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Galvanizing Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle Manufacturing Corporation, Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating Wire
American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Sales Corp., Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio.
Michigan Oven Company, Detroit, Mich.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lacquering Electric Wire
American Insulating Mach'y Co., Philadelphia.
Cook Mfg. Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, O.
Michigan Oven Company, Detroit, Mich.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
Cedar West Tool Inc., New York, N. Y.
Mummert-Dixon Co., Hanover, Pa.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Material Handling
(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable
Durant Mfg. Co., Milwaukee, Wis.
Entwistle Manufacturing Corporation, Providence, R. I.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Baird Machine Co., The Stratford, Conn.
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.
Seybold Transworld Exporters, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Packaging Wire
Coulter & McKenzie Machine Co., Bridgeport, Conn.

MACHINERY—Pickling
Youngstown Welding & Eng'g Co., Youngstown, Ohio.

MACHINERY—Pin Making
Baird Machine Co., The, Stratford, Conn.

MACHINERY—Plating
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Pointing
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury Conn.

MACHINERY—Pumps for Molten Metal
Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Re-Spooling
Boyd & Sons Manufacturing Corporation, Philadelphia, Pa.
Emory, Robert J., Co., Newark, N. J.
International Wire Products Corp., Woodside Machinery Division, Midland Park, N. J.
Mummert-Dixon Co., Hanover, Pa.
National Mach'y Exch. (Used), New York.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J.
Wire Insulating Machinery Inc., Northboro, Mass.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Rod Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.

MACHINERY—Rolling Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Insulating
Davis-Standard Sales Corp., Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio.
Royle, John & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Serving
Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Spark Testing
Entwistle Manufacturing Corporation, Providence, R. I.
Peschel Electronics, Inc., New Rochelle, N. Y.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Staple
Nilson, A. H. Machine Co., Bridgeport, Conn.
Seybold Transworld Exporters, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Straightening & Cutting
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Stranding
Carter & Co., Ltd., B. & F., Bolton, England
Haskell-Dawes Machine Co., Philadelphia, Pa.
Milton Machine Works, Inc., Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Swaging
Fenn Manufacturing Co., Newington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Take-Up and Pay-Out
American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Sales Corp., Mystic, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Fenn Manufacturing Co., Newington, Conn.
Industrial Ovens, Inc., Cleveland, Ohio
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Litzler, C. A., Co., Inc., Cleveland, Ohio.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Testing Magnet Wire Coatings for Pin Holes
Peschel Electronics, Inc., New Rochelle, N. Y.

MACHINERY—Testing, Physical
Scott Testers, Inc., Providence, R. I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill, Cold Drawing
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Turks Head
Fenn Manufacturing Co., Newington, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.

MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot and Machinery—Welding Wire Fabrics)

MACHINERY—Winding Wire
Emory, Robert J., Newark, N. J.
Fenn Manufacturing Co., Newington, Conn.
Hobbs Manufacturing Co., Worcester, Mass.
Mummert-Dixon Co., Hanover, Pa.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J.
Wire Insulating Machinery Inc., Northboro, Mass.

MACHINERY—Wire Drawing
Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Fenn Manufacturing Co., Newington, Conn.
Herborn, Herborn, Germany
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Morgan Construction Co., Worcester, Mass.
Morgardshammers Mek Verstads AB, Morgardshammer, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Wire Forming
Baird Machine Co., The, Stratford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Wire Rope
Carter & Co., Ltd., B. & F., Bolton, England.
Milton Machine Works, Inc., Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
Larmuth (1947) Ltd., Swinton, England
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MOTORS—Electric, A. C. & D. C.
The Louis Allis Company, Milwaukee, Wisc.

NAIL TOOLING—Tungsten Carbide
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Brothers, Inc., Cortland, N. Y.

NIPPERS—Wire Cutting
Robinson, M. W. Co., Rockfall, Conn.

NOZZLES—For Extruding Machines
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio.
Litzler, C. A., Co., Inc., Cleveland, Ohio.
Michigan Oven Company, Detroit, Mich.
Rockwell Co., W. S., Fairfield, Conn.

OVENS—Rod Bakers
Carl Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio.

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAPER—Creped Wrapping
Angier Corporation, Framingham, Mass.
Arkell Safety Bag Company, New York, N. Y.
National Waterproof Papers, Inc., Beverly, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—For Coil Wrapping and Corrosion Prevention
Angier Corporation, Framingham, Mass.
Arkell Safety Bag Company, New York, N. Y.
National Waterproof Papers, Inc., Beverly, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—Insulating
Plymouth Cordage Company, Plymouth, Mass.

PATENT ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D. C.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Pnosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PICKLING—Hooks, etc. Acid Resisting
Youngstown Welding & Eng'g Co., Youngstown, Ohio

PICKLING TANK LININGS—
Chemsteel Construction Co., Inc., Pittsburgh, Pa.

PLASTICIZERS—
Celanese Corporation of America, New York, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

PLASTICS—for Wire Insulation
Celanese Corporation of America, New York, N. Y.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
Electronic Rubber Co., Stamford, Conn.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, Ohio

PUMPS—Molten Metal
Fisher Associates, New York, N. Y.

REEL AND TENSION STANDS—
Industrial Ovens, Inc., Cleveland, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc.,Minneapolis, Minn.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Inc., Milton, Pa.
Muncy Valley Industries, Inc., Muncy Valley, Pa.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Muncy Valley Industries, Inc., Muncy Valley, Pa.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio

REELS—Metal Bound
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
North Anson Reel Co., No. Anson, Me.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS—Plywood
Carris Reels, Inc., Rutland, Vt.
Hubbard Spool Co., Garrett, Ind.
Nelson Company, The, Baltimore, Md.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L. Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Garrett, Ind.
Mason Can Company, East Providence, R. I.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
Mason Can Co., East Providence, R. I.
Mettler Machine Tool, Inc., New Haven, Conn.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Nilson, A. H. Machine Co., Bridgeport, Conn.
North Anson Reel Co., No. Anson, Me.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wood
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
Muncy Valley Industries, Inc., Muncy Valley, Pa.
Nelson Company, The, Baltimore, Md.
North Anson Reel Co., No. Anson, Me.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Crucible Steel Co. of America, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.

RODS—Wire—Non-Ferrous
Chase Brass & Copper Co., Waterbury, Conn.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Titan Metal Manufacturing Co., Bellefonte, Pa.

RODS—Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—Rust Preventing)

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—(See Reels & Spools)

SPOOLS—Stamped Metal for Retail Wire Sales
Clark, J. L. Mfg. Co., Rockford, Ill.
Mason Can Company, East Providence, R. I.

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Pickling and Plating
Chemsteel Construction Co., Inc., Pittsburgh, Pa.

TESTERS — INSULATION
(See MACHINERY—Spark Testers)

TESTING EQUIPMENT
(See MACHINERY Testing, Physical and Diameter Testing)

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.
Wire Equipment Mfg. Co., Trenton, N. J.

TOOLS—Wire Cutting
Porter, H. K. Inc., Somerville, Mass.

TOOLS—Spring Forming, Carbide
Crafts, Arthur A., Company, Inc., Boston, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRANSMISSIONS—Variable speed (See Adjustable Speed Drives)

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

VARNISHES & LACQUERS—for Electric Wire
Chemical Products Co., E. Providence, R. I.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila., Pa.
Litzler, C. A., Co., Inc., Cleveland, Ohio.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire Insulating Machinery Inc., Northboro, Mass.

WELDERS—Spot and Butt and Welding Wire Fabrics
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago, Ill.

WIRE—Aluminum
Alabama Wire Company, Florence, Ala.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Scovill Mfg. Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Barbed
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brass and Bronze
Chase Brass & Copper Co., Waterbury, Conn.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Jury's Wire Products, Inc., Bloomfield, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Bunched & Stranded, Copper
Camden Wire Co., Camden, N. Y.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Camden Wire Co., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Copper
Camden Wire Co., Inc., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Jury's Wire Products, Inc., Bloomfield, N. J.
United Wire & Supply Corporation, Providence, R. I.

WIRE—For Electrical Conductors
Camden Wire Co., Camden, N. Y.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Flat, Fine
Montgomery Co., The, Windsor Locks, Conn.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Galvanized
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
National Standard Company, Niles, Mich.
Roebling's, John A. Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Manufacturers
Alabama Wire Company, Florence, Ala.
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
National Lock Washer Company, The, Newark, N. J.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.
U. S. Steel Corp., N. Y., N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O

WIRE—Music
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio

WIRE—Needle
Carpenter Steel Company, Webb Wire Division, New Brunswick, N. J.

WIRE—Nickel Alloy
Carpenter Steel Company, Webb Wire Division, New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Malin & Co., The, Cleveland, Ohio
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Oil Tempered
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Silver Plated Copper
Camden Wire Co., Camden, N. Y.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.

WIRE—Special Shapes
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
National Lock Washer Company, The, Newark, N. J.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Spring
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O

WIRE—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Carpenter Steel Company, Webb Wire Division, New Brunswick, N. J.
Crucible Steel Co. of America, Pittsburgh, Pa.
Firth Sterling, Inc., Pittsburgh, Pa.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
National Lock Washer Company, The, Newark, N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Steel—Also Coppered and Galvanized Steel
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Jury's Wire Products, Inc., Bloomfield, N. J.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J
Sheffield Steel Corp., Kansas City, Mo.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Brothers, Inc., Cortland, N. Y
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Tinned Copper
Camden Wire Co., Camden, N. Y.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Jury's Wire Products, Inc., Bloomfield, N. J.

WIRE—Weaving
Alabama Wire Company, Florence, Ala.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WOOD—for Guide, Rolls, Bushings, Wear Parts, etc.

WRAPPING PAPER—Creped
(See PAPER—Creped Wrapping)

YARNS & TAPES—Insulating
Celanese Corporation of America, New York, N. Y.
Pittsburgh Plate Glass Company, Pittsburgh, Pa.

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

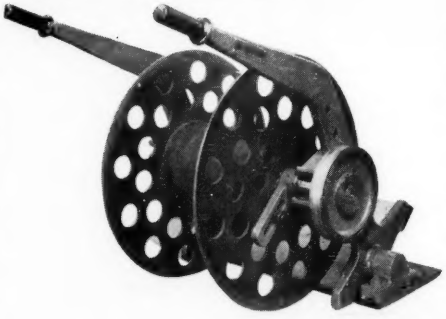
PATERSON 3, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE AND MASTICATING MACHINERY MANUFACTURERS

WATSON

HEAVY DUTY LETOFFS

OFFERED IN MANY DESIGNS AND SIZES, OF WHICH THE ONE MAN TYPES ILLUSTRATED HERE ARE EXAMPLES.



TYPE "LA"

21"/30" UNIT SHOWN IN LOADING POSITION. DUMP TYPE WITH ADJUSTABLE SPINDLE BEARING HEIGHT. RIGID CONSTRUCTION INSURES POSITIVE BEARING ALIGNMENT. BUILT IN SIZES UP TO 36" FLANGE DIAMETER.

"DEAD-REEL" TYPE

No. W-2942 SHOWS UNIT FOR 24" DIA. REELS. DESIGNED FOR CONTINUOUS CONSTANT TENSION OPERATION IN CONJUNCTION WITH CONTINUOUS VULCANIZING AND OTHER EXTRUSION EQUIPMENT. BUILT FOR REEL SIZES TO 24" FLANGE DIAMETER.

TYPE "H"

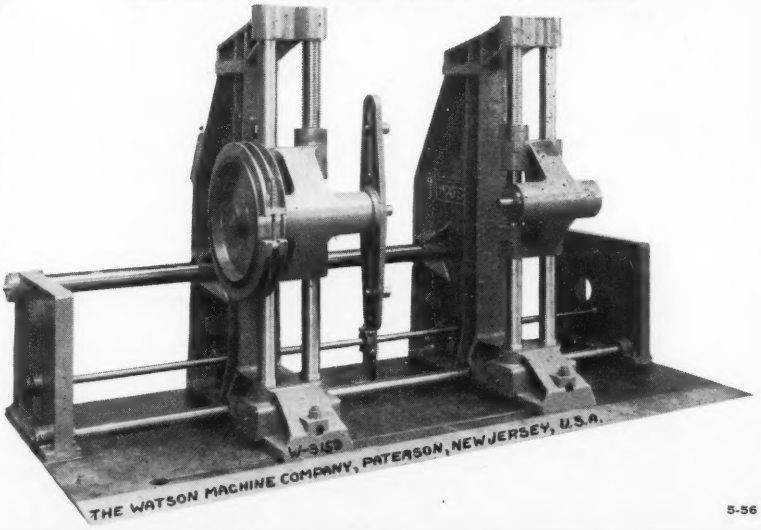
No. W-4411 FOR 60" DIAMETER 5 TON REELS. LIFT OPERATED BY HYDRAULIC JACK. TORQUE TUBE INSURES REEL SHAFT BEARING ALIGNMENT. WIDELY USED IN WIRE MILLS, CABLE PLANTS, WAREHOUSES AND SHIPPING ROOMS. THE VARIOUS SIZES PROVIDE FLOOR PICK-UP OF REELS FROM 16" TO 96" FLANGE DIA. AND WILL LIFT MAX. LOADS FROM 3 TO 10 TONS.

TYPE "V" (U.S. Patent 1,825,218)

No. W-3159 FOR 96" DIA. 10-TON REELS. "SHAFTLESS", FULLY MOTORIZED DESIGN ALLOWS RAPID, SAFE LOADING AND UNLOADING OF THE LARGEST SIZE REELS. THE VARIOUS SIZES LIFT REELS FROM 36" TO 120" FLANGE DIAMETER DIRECTLY FROM THE FLOOR. THE SMALLEST MODEL HAS 6, THE LARGEST 30 TON CAPACITY.

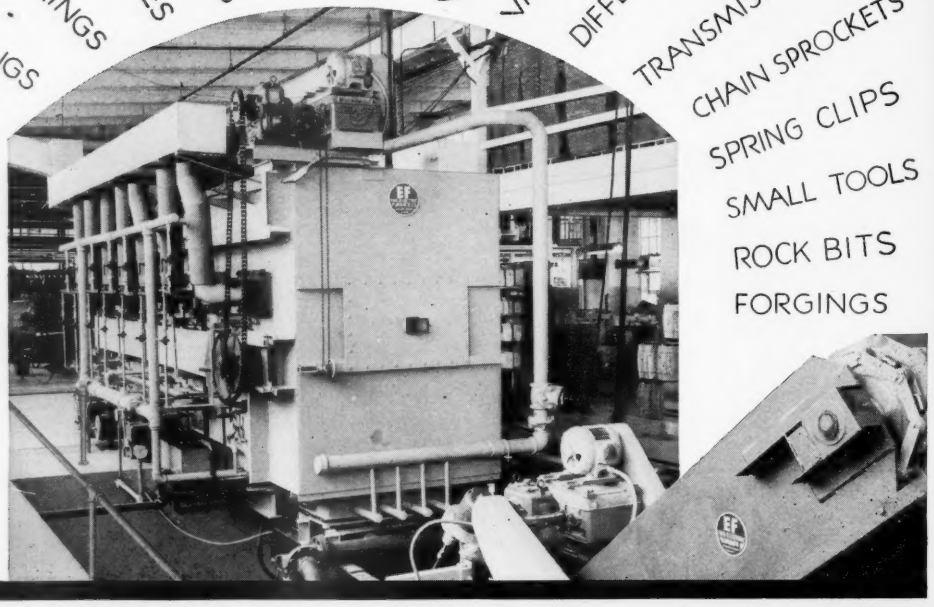
* * *

Bulletins Covering Each Type Available .



5-56

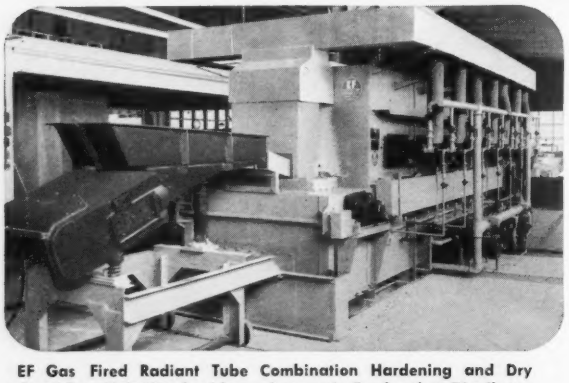
PARTS FOR BEARINGS
SPRING PLATES
CAP SCREWS
PINIONS
BOLTS - NUTS
RIVETS
WRENCH PARTS
VALVE SPRINGS
DIFFERENTIAL GEARS
TRANSMISSION GEARS
CHAIN SPROCKETS
SPRING CLIPS
SMALL TOOLS
ROCK BITS
FORGINGS
ROLLER BEARINGS
TRACTOR LINKS
AIRCRAFT PARTS
WASHERS
ENGINE PARTS
COIL SPRINGS



For Carbonitriding, Carbon Correction, Carburizing

Non-Decarb, Scale-Free Hardening and other Processes

Uniformly—Scale-Free—Continuously, 175 to 2000 lbs. per hour.



EF Gas Fired Radiant Tube Combination Hardening and Dry Cyaniding Unit Fitted with an Automatic Feeder that Distributes the Parts Evenly on the Chain Belt Conveyor; and a Dual Quench.
(View at top) The Conveyorized, Partitioned Dual Quench Moves Laterally to Permit either the Complete Oil or the Water Quenching Equipment to be Positioned under the Sealed Furnace Discharge.

• The EF chain belt conveyor furnace is one of the most satisfactory continuous heating units yet devised for scale-free hardening, carbon restoration, carbonitriding, carburizing and non-decarb heat treating small and medium size parts. The material is loaded onto our rugged heat resisting cast link conveyor belt; carried through the furnace; heated uniformly to proper temperature; automatically quenched and discharged. No pans or trays are needed. Hundreds in daily operation prove the dependability and efficiency of our design. 11 standard sizes. Capacities to 2000 lbs. or more per hour. Gas, oil or electrically heated. Furnished complete with any desired feeding, discharging or special atmosphere equipment. Write for folders describing our chain belt conveyor type and other production furnaces.

Ask For Bulletin 462-CB.

THE ELECTRIC FURNACE CO.

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES
FOR ANY PROCESS, PRODUCT OR PRODUCTION

Salem - Ohio

Canadian Associates • CANEFCO, LIMITED • Toronto 1, Canada